Precision Cooling
For *Business-Critical Continuity™*

Liebert® XDH™

User Manual - 50 & 60Hz

EMERSON
Network Power

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GENERAL SAFETY GUIDELINES

SAVE THESE INSTRUCTIONS

This manual contains important safety instructions that should be followed during the installation and maintenance of the Liebert XDH. Read this manual thoroughly before attempting to install or operate this unit.

Only qualified personnel should move, install or service this equipment.

Adhere to all warnings, cautions and notices and installation, operating and safety instructions on the unit and in this manual. Follow all operating and user instructions.

WARNING

Risk of top-heavy module falling over. Can cause injury or death.

Improper handling can cause equipment damage, injury, or death. Read all of the following instructions before attempting to move, lift, remove packaging from the module, or preparing module for installation.

WARNING

Risk of explosive discharge. Can cause injury or death.

This module contains fluids and/or gases under high pressure. Relieve system pressure before cutting into or disconnecting piping or piping components.

WARNING

Risk of high-speed moving parts. Can cause injury or death.

Disconnect all local and remote electric power supplies and verify that the fan blades have stopped rotating before working in the module.

WARNING

Risk of electric shock. Can cause injury or death.

Disconnect both power cords from the electrical supply outlets or from the receptacles on the back of the module before working within.

WARNING

Risk of refrigerant system rupture or explosion from over pressurization. Can cause equipment damage, injury or death.

For systems requiring EU CE compliance (50Hz), the system installer must provide and install a discharge pressure relief valve rated for a maximum of 105 PSI (7.2 bar) in the refrigerant circuit. Do not install a shutoff valve between the refrigerant pump and the field installed relief valve. The pressure relief valve must be CE-certified to the EU Pressure Equipment Directive by an EU "Notified Body."

CAUTION

Risk of sharp edges, splinters and exposed fasteners. Can cause personal injury.

Only properly trained personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from, or prepare module for installation.

CAUTION

Risk of improper operation and overpressurization. Can cause equipment damage or personal injury.

Only qualified personnel trained in HVAC installation or service should install or service this equipment.

Read all installation, operating and safety instructions before proceeding.

NOTICE

Risk of overhead interference. Can damage module or structure.

The module may be too tall to fit through a doorway while on the skid. Measure the module and doorway heights and refer to the installation plans before moving the module to verify clearances.

Fluorinated Greenhouse Gas Requirements—European Union

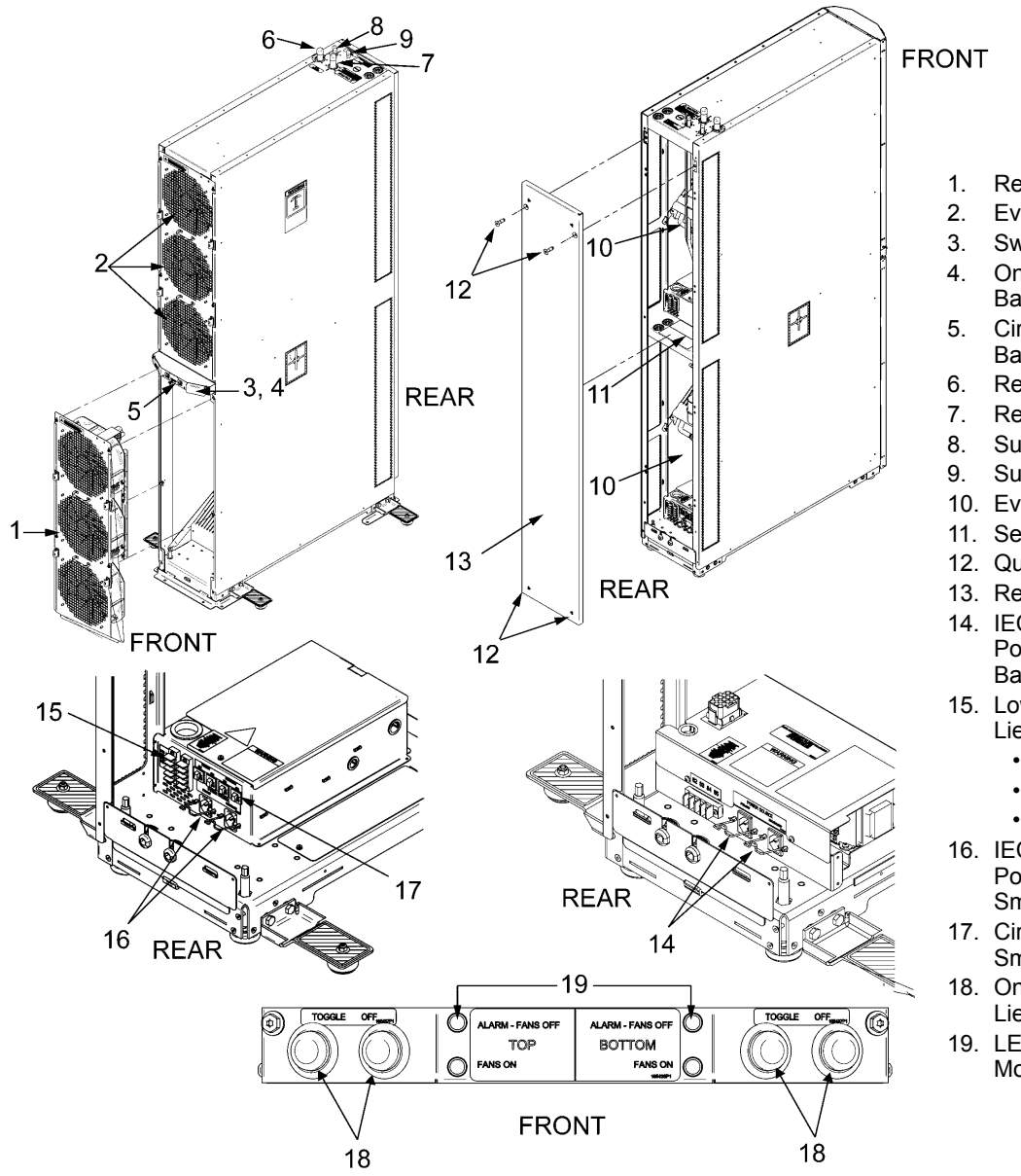
Stationary air conditioning, refrigeration, heat pump equipments and stationary fire protection systems in the European Community market and operating with fluorinated greenhouse gases (f-gas), such as R407C, R134a, R410A, must comply with the F-Gas Regulation: (EC) No. 842/2006 (F-gas). The regulation prohibits, among other actions, venting fluorinated greenhouse gases to the atmosphere.

The F-Gas Regulation also requires operators to use use all measures that are technically feasible and do not entail disproportionate cost to prevent leakage of these gases, to test for leakage regularly and to recover f-gas during equipment service and maintenance and before disposing of equipment.

Refer to the full regulation for additional details.

1.0 LIEBERT XDH COMPONENT LOCATIONS AND MODEL NUMBER NOMENCLATURE

Figure 1 Liebert XDH component locations



1. Removable Fan Tray
2. Evaporator Fans
3. Switch Cover
4. On/Off Switch - Liebert XDH Basic
5. Circuit Breaker - Liebert XDH Basic
6. Return Line - Bottom Circuit
7. Return Line - Top Circuit
8. Supply Line - Bottom Circuit
9. Supply Line - Top Circuit
10. Evaporator Coils
11. Serial Tag
12. Quarter-Turn Fasteners
13. Rear Panel
14. IEC Primary and Secondary Power Inlets - Liebert XDH Basic
15. Low-Voltage Terminal Block - Liebert XDH Smart Module
    - Condensate Detection
    - Remote Shutdown
    - Fan Failure Alarm
16. IEC Primary and Secondary Power Inlets - Liebert XDH Smart Module
17. Circuit Breakers - Liebert XDH Smart Modules
18. On/Off Push Button Switch - Liebert XDH Smart Modules
19. LEDs - Liebert XDH Smart Modules

Figure 2 Liebert XDH model number nomenclature

Example: XDH32BK— —*

XD	H	32	B	K	—	—	*
Liebert X-treme Heat Density System	Horizontal Row Cooler	20 = Model Size 32 = Model Size	B = Basic Module S = Smart Module	K = 120V-1ph-60Hz S = 208-240-1ph-60Hz 220-240-1ph-50Hz	— = Hard-Piped P = Pre-Charged One-Shot Coupling R = Removable Coupling	— = Domestic Packaging E = Export Packaging	Revision Level

2.0 INTRODUCTION

2.1 References

This document must be used together with site-specific documentation and documentation for other parts of the system.

2.2 Pre-Installation Checks

- Verify that the Liebert XDH voltage matches the available utility power. The serial tag with this information is accessible by removing the Liebert XDH's rear panel. The tag is on a shelf near the Liebert XDH's midline.
- Check the received materials to be sure all required assemblies and parts have been received. If you discover any external damage, report it to the shipping company and your local Emerson Network Power representative.

2.3 Packing List

- User manual (this document)
- Liebert XDH module
- Power cords
- Shipping/floor mounting brackets
- Tie-down bracket assembly
- Diffusers (top and bottom)

2.4 Installation Considerations

The Liebert XDH is designed for placement within a row of computer cabinets in the data center in a hot-aisle-cold-aisle arrangement. The Liebert XDH is 12" (305mm) wide, so it takes up little space. For installation arrangement, see **5.1 - Installing the Liebert XDH Within the Enclosure Row**. Be sure to follow all applicable codes.

Determine whether the Liebert XDH includes the condensate detection option (factory-installed; discontinued April 2009) or the smart module control board (factory-installed). Each of these options requires separate low-voltage connections to a monitoring unit. To minimize the possibility of condensation, insulate all piping between the Liebert XDH and the Liebert XDP or Liebert XDC.

If the Liebert XDH is installed at the end of a row, Emerson recommends using uni-directional air diffusers to direct cooling air into the cold aisle, toward the equipment racks. If the Liebert XDH is installed between racks within a row, Emerson recommends using bi-directional air diffusers, directing the cooling air toward the equipment racks on either side of the Liebert XDH.

Table 1 Application limits

Input Voltage		Range of Return Air Conditions to Module	
Minimum	Maximum	Dry Bulb Temperature	Relative Humidity
-10%	+10%	60° to 100°F (16° to 38°C)	20% to 80%

2.4.1 Room Preparation

The room should be well-insulated and must have a sealed vapor barrier. The vapor barrier in the ceiling and walls can be a polyethylene film. Paint on concrete walls and floors should contain either rubber or plastic.

NOTE

The vapor barrier is the single most important requirement for maintaining environmental control in the conditioned space.

Outside or fresh air should be kept to a minimum when temperature and humidity must be tightly controlled. Outside air adds to the cooling, heating, dehumidifying and humidifying loads of the site. Doors should be properly sealed to minimize leaks and should not contain ventilation grilles.

3.0 GENERAL PRODUCT INFORMATION

3.1 Product/System Description

The Liebert XDH is designed for placement within a row of computer cabinets in the data center in a hot-aisle-cold-aisle arrangement to maximize the Liebert XDH's cooling. The Liebert XDH, a half-rack in width, is intended for use with a Liebert XD pumped refrigerant cooling system, supplied by either a Liebert XDP or Liebert XDC. The module takes in hot air through the rear from the hot aisle, cools the air by air-to-fluid heat exchangers and discharges the air through the front of the module into the cold aisle in a diffuse pattern. The cooling air is then drawn into the enclosures to cool the equipment.

Replaceable front panels on the Liebert XDH may be customized to match the appearance of various computer manufacturer's equipment, allowing the Liebert XDH to blend in with adjacent server equipment and enclosures. Unidirectional and bidirectional diffusers are available to direct cooling air for more efficient cooling, depending on the Liebert XDH's positioning in a row or at the end of a row.

Chilled R-134a refrigerant is provided to the Liebert XDH by a Liebert XD Pumping unit (Liebert XDP) or by a Liebert XD Chiller (Liebert XDC). The Liebert XDH has dual refrigeration circuits, one in the upper half of the module and the other in the lower half. This permits increasing and decreasing cooling levels in response to server room conditions. The dual refrigeration circuits permits interlaced connection of two Liebert XD refrigerant sources to enhance system reliability. The Liebert XDH may be installed in a Liebert XD piping system that includes other Liebert XD cooling modules.

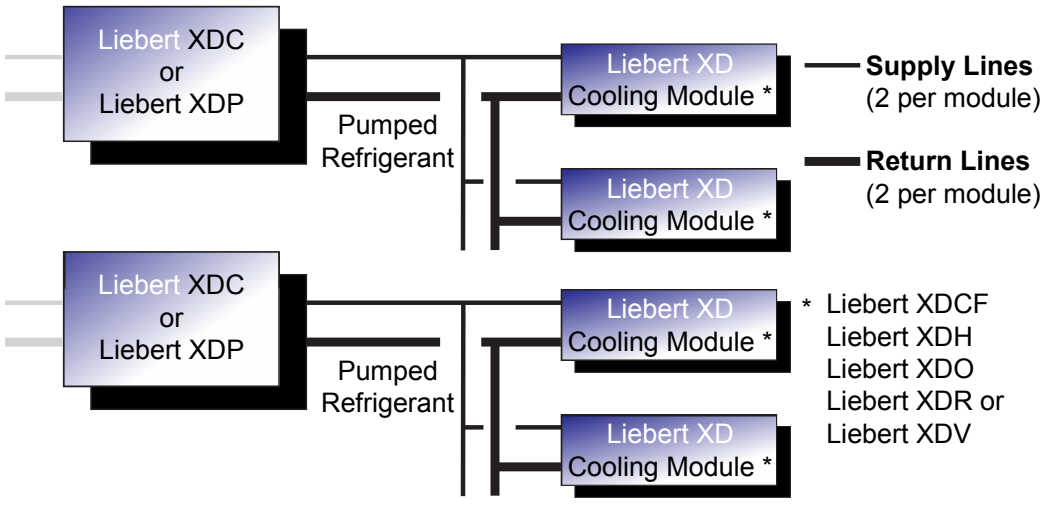
Controls on the front of the Liebert XDH permit independent operation of the two banks of fans. Dual power connections ensure continued fan operation if one of two electrical sources fails.

The Liebert XDH is not expected to produce any condensation because of its location, usually in the data center. A condensate pan is provided as a precaution. It does not have a drain fitting or other means of being emptied.

Optional smart modules allow remote shutdown, fan failure alarms, condensate detection and switching fan per bank On and Off. This saves energy by permitting the module to run with two fans per bank and switching on the middle when the temperature requires all fans for cooling.

The complete cooling system consists of Liebert XDH modules, Liebert XDP or Liebert XDC pumped refrigerant distribution units, power and signal cabling and interconnecting piping, see **Figure 3** below.

Figure 3 Generic piping layout



3.2 Checking and Unpacking

Upon arrival of the module and before unpacking, verify that the labeled equipment matches the bill of lading. Carefully inspect all items for either visible or concealed damage. Damage should be immediately reported to the carrier and a damage claim filed with a copy sent to Emerson or to your sales representative. If you later find any concealed damage, report it to both the shipping company and your local Emerson representative.

Check to be sure all required assemblies and parts have been received.

The Liebert XDH is shipped in protective packaging and secured to a pallet (see **Figure 5**). Do not remove these protective items from the Liebert XDH before it is at the installation location. When unpacking and handling the Liebert XDH, exercise extra care to prevent damage.

CAUTION

Risk of sudden refrigerant discharge. Can cause loss of charge and minor injury.

If the optional pre-charged option is chosen, the Liebert XDH module is shipped with a full charge of R-134a refrigerant under pressure. Do not remove the pipe caps or plugs before the module is ready for connection to Liebert XD Piping.

Supply and return fittings on the pre-charged Liebert XDH modules are one-shot couplings. Do not disconnect one-shot couplings after they have been connected. Disconnection will release pressurized R-134a refrigerant from the Liebert XDH.

3.2.1 Recyclable Packaging

All material used to package this module is recyclable. Please save for future use or dispose of the material appropriately.

WARNING

Risk of top-heavy module falling over**.** Can cause equipment damage, injury and death.

Read all of the following instructions before attempting to move, lift, remove packaging from the module, or preparing module for installation.

Use extreme caution and care when moving and installing this unit. Use lifting equipment that is rated for the weight of the unit by an OSHA-certified rating organization. See **Tables 9** and **10** for unit weights. Personnel should be properly trained and qualified to move and rig equipment

CAUTION

Risk of sharp edges, splinters and exposed fasteners. Can cause personal injury.

Only properly trained personnel wearing appropriate safety headgear, gloves, shoes and glasses should attempt to move, lift, remove packaging from, or prepare module for installation.

NOTICE

Risk of overhead interference. Can cause module or structure damage.

The module may be too tall to fit through a doorway while on the skid. Measure the module and doorway heights and refer to the installation plans before moving the module to verify clearances.

NOTICE

Risk of improper storage. Can cause module damage.

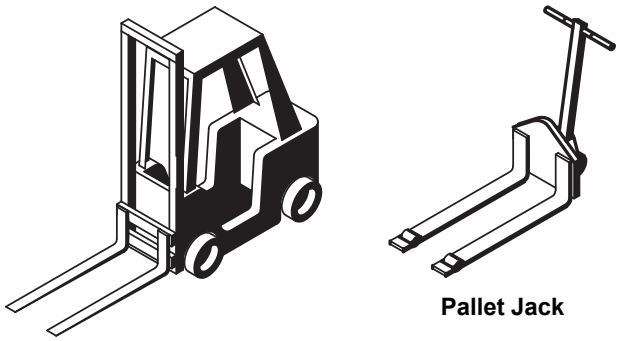
Keep the module indoors and protected from dampness, freezing temperatures and contact damage.

NOTICE

Risk of damage from forklift. Improper handling with the forklift can cause exterior and/or underside damage.

Keep tines of the forklift level and at a height suitable to fit below the pallet.

Figure 4 Recommended module handling equipment



3.2.2 Module Handling

If possible, transport the module using a forklift or pallet jack.

- If using a forklift or pallet jack, ensure that the fork tine length is suitable to safely move the packaged module.
- Emerson recommends keeping the module in the protective packaging until it has been moved to the installation site.
- When handling and unpacking the module, exercise great care to prevent damage.
- Do not lift the module any higher than 6" (152mm) while moving it. If it must be lifted higher than 6" (152mm), exercise great care and keep all personnel who are not helping move the module at least 20' (5m) away from the module.
- The Liebert XDH ships with four outrigger-style wheels to permit rolling it into position. Emerson recommends using a forklift or pallet jack to move the Liebert XDH as near as practical to its installation site before removing it from the shipping pallet.

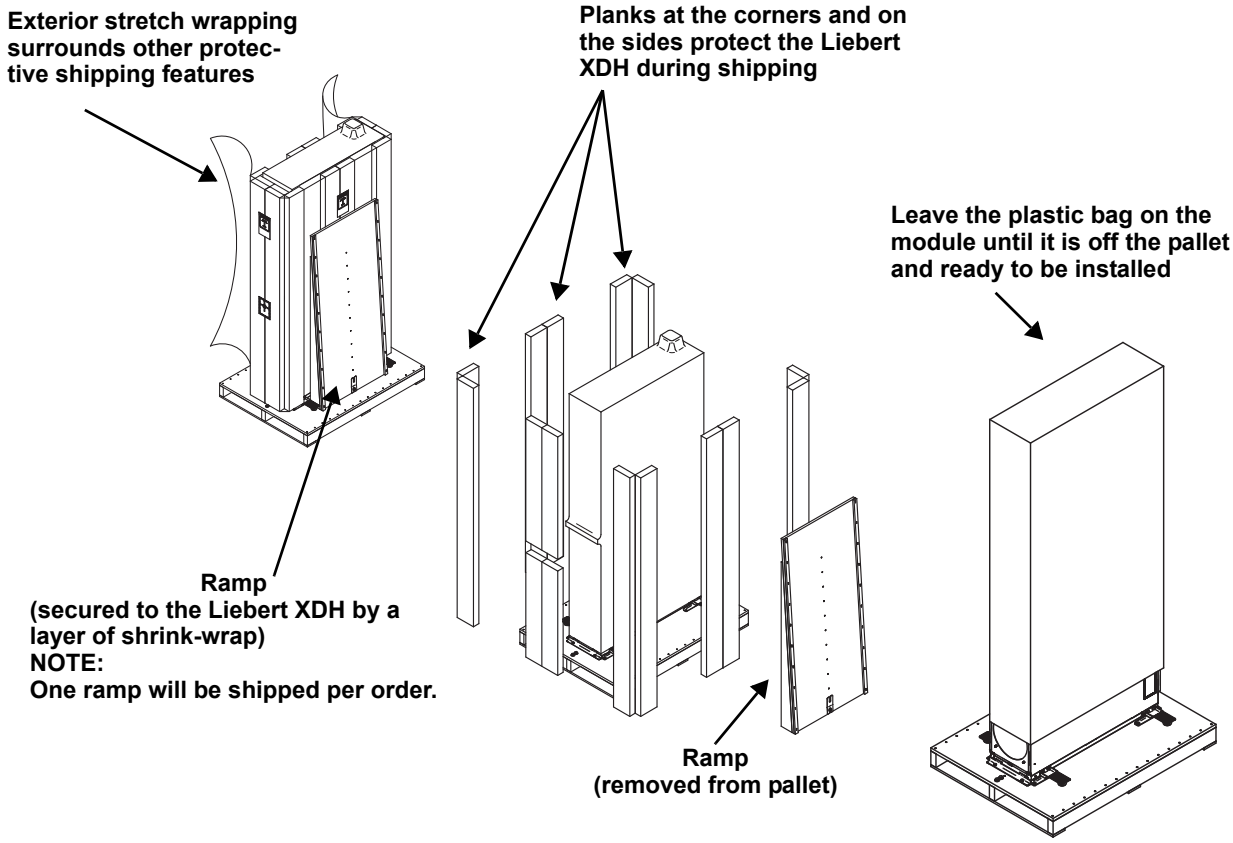
3.2.3 Unpacking the Module

Domestic Packaging

1. Remove the exterior stretch-wrap packaging from around the module, exposing the protective corner and side packaging planks.
2. Remove the ramp, corner and side packaging planks from the module, exposing the bag over the module.

   Remove the bag when ready to install the Liebert XDH.

Figure 5 Removing domestic shipping packaging


Exterior stretch wrapping surrounds other protective shipping features
Planks at the corners and on the sides protect the Liebert XDH during shipping
Leave the plastic bag on the module until it is off the pallet and ready to be installed
Ramp
(secured to the Liebert XDH by a layer of shrink-wrap)
NOTE:
One ramp will be shipped per order.
Ramp
(removed from pallet)

3.2.4 Taking the Module off the Pallet

WARNING

Risk of unsecured module rolling off pallet. Can cause equipment damage, injury or death.

The Liebert XDH is on casters. Ensure that the module/skid is located on a flat surface before loosening the hardware securing the Liebert XDH to its shipping pallet.

The Liebert XDH ships with four outrigger-style wheels to permit rolling it into position for installation. Emerson recommends using a forklift or pallet jack to move the Liebert XDH as near as practical to its installation site before removing it from the shipping pallet.

1. Locate the ramp that was shipped with the Liebert XDH (see **Figure 5**).
2. Loosen the hex screw on the ramp and remove the metal bracket (see **Figure 6**).
3. Rotate the metal bracket 180 degrees and insert the shortest slot of the metal bracket under the hex screw head and tighten the hex screw.
4. Loosen the two hex screws on the skid.
5. Align the ramp and the metal bracket with the skid. Ensure that the ramp is in contact with the skid (see **Figure 7**).
6. Insert the opposite end of the metal bracket under the hex screws on the skid. (see **Figure 7**)
7. Tighten the hex screws on the skid.
8. Remove the six hex screws from each of the two tie-down brackets, one located on either end of the Liebert XDH. (see **Figure 7**).
9. Remove the two tie-down brackets.
10. At least two properly trained personnel may roll the Liebert XDH down the ramp and off the pallet onto a flat surface.

Figure 6 Prepare ramp to remove the Liebert XDH from shipping pallet

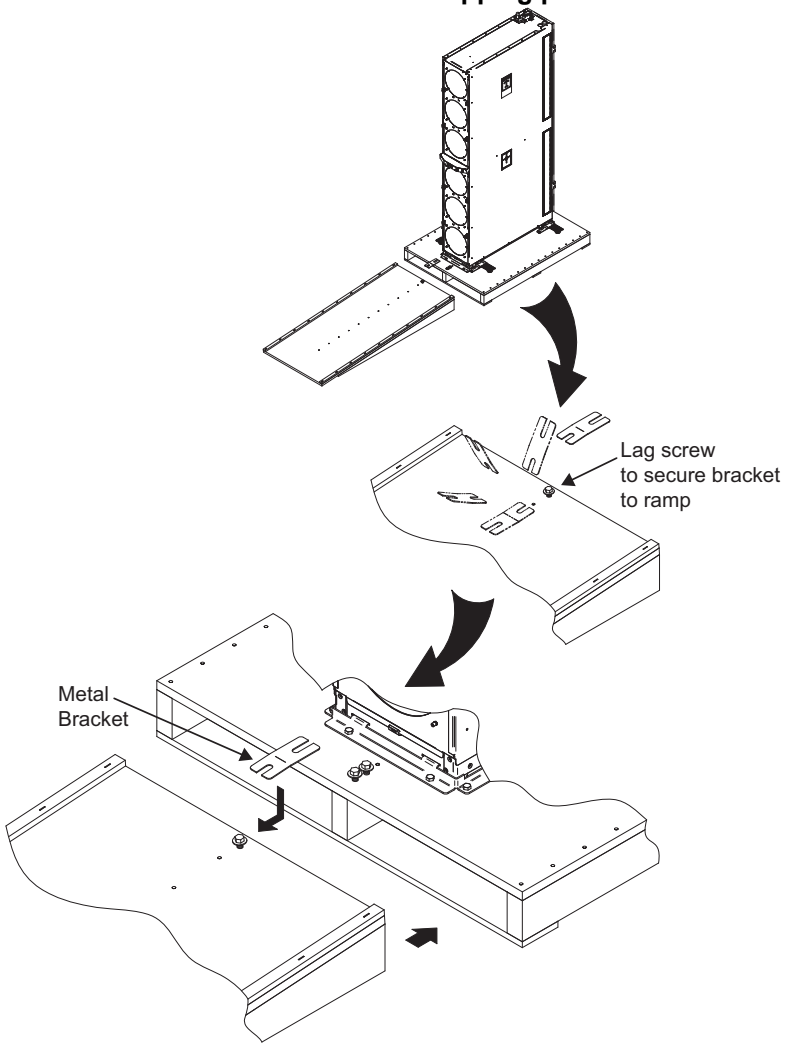
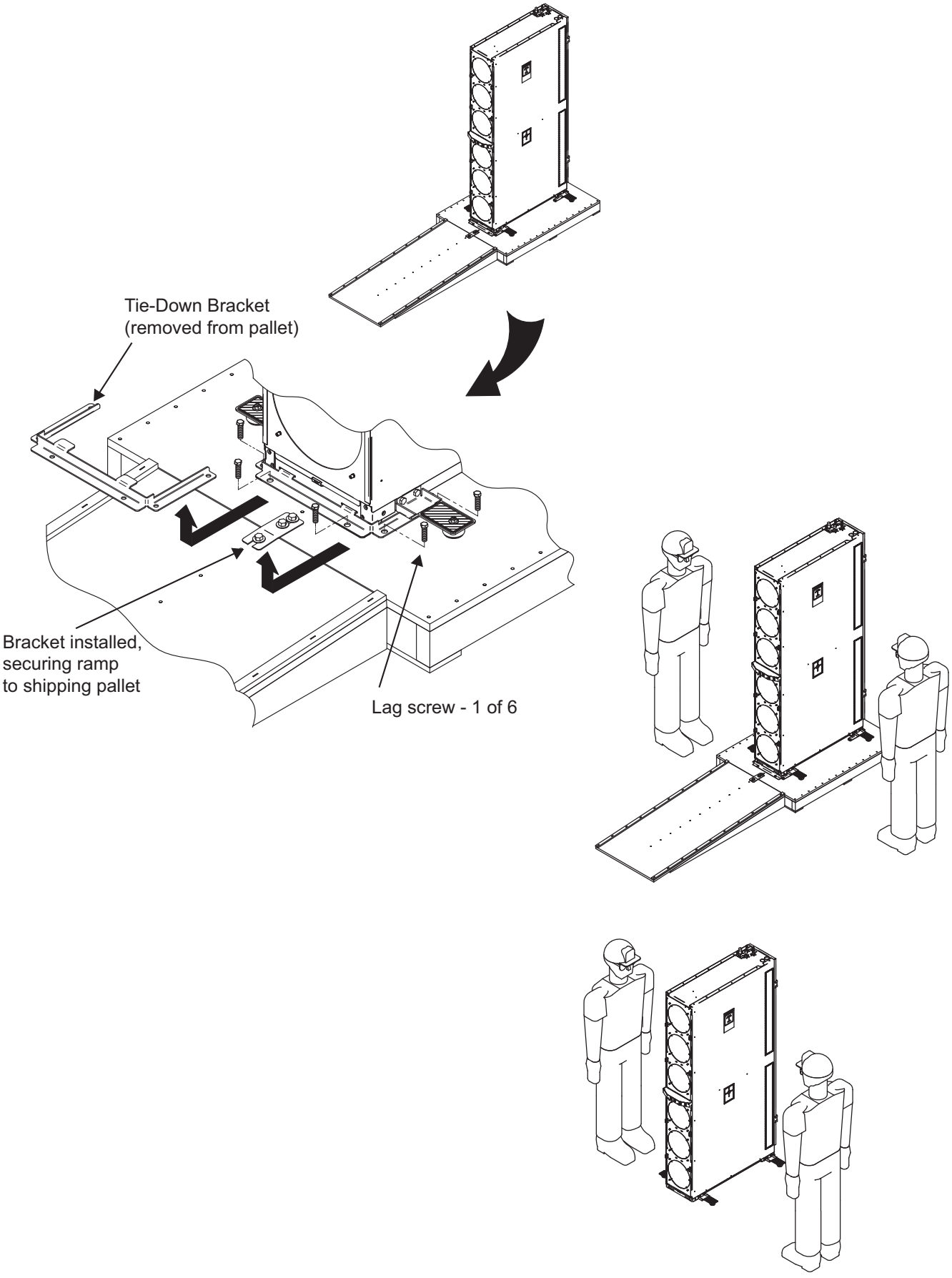


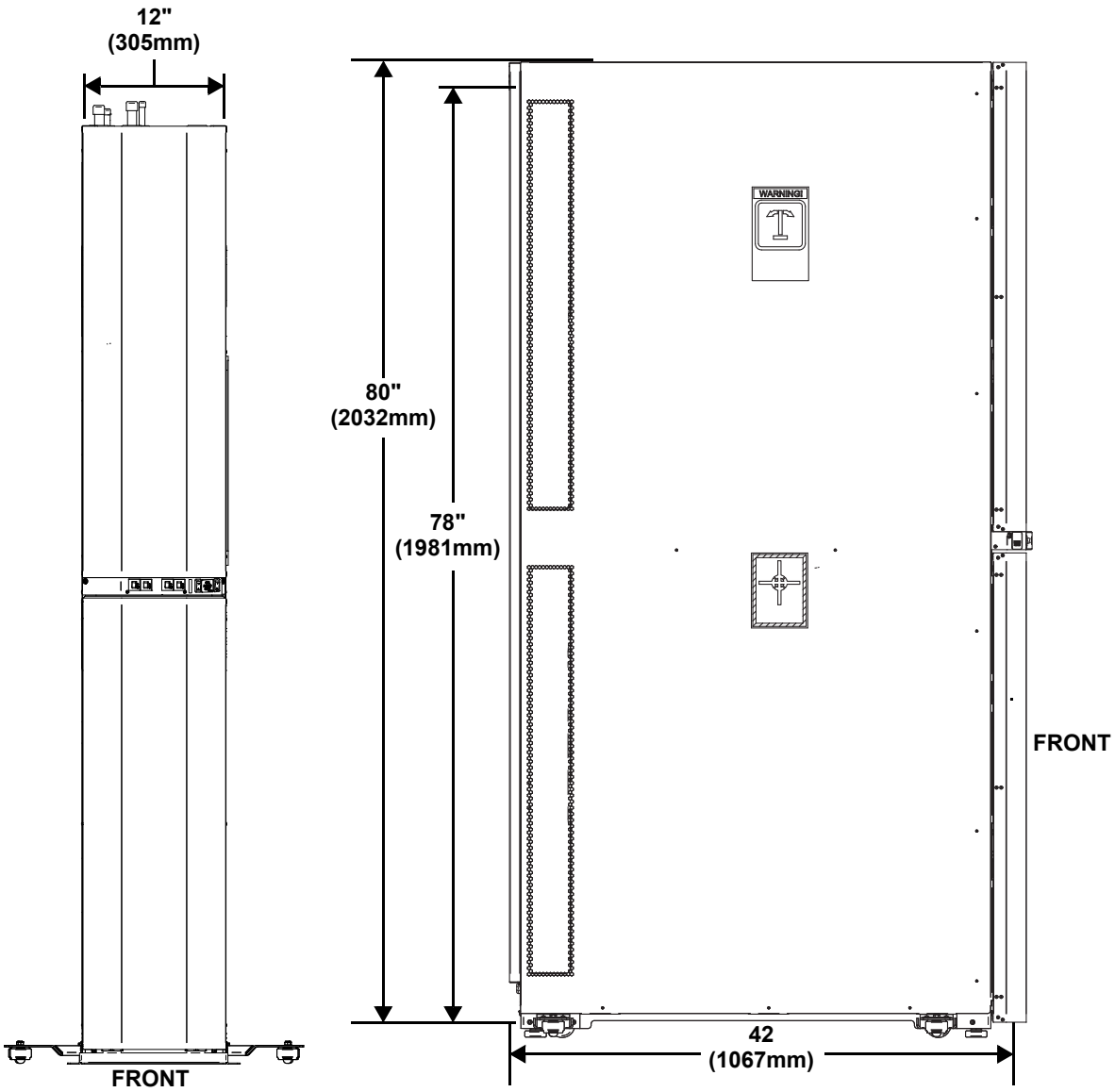
Figure 7 Attaching ramp, removing the Liebert XDH from pallet



4.0 MECHANICAL CONSIDERATIONS

4.1 Liebert XDH Dimensions

Figure 8 Liebert XDH dimensions



4.2 Determining Placement in the Conditioned Space

Refer to site-specific drawings for exact spacing. The Liebert XDH should be placed among the cabinets that generate the greatest amount of heat. If heat loads are dispersed evenly throughout the room, the Liebert XDH modules may be spread out accordingly.

The Liebert XDH is engineered to fit among computer enclosure cabinets. **Figure 8**, above, illustrates the dimensions.

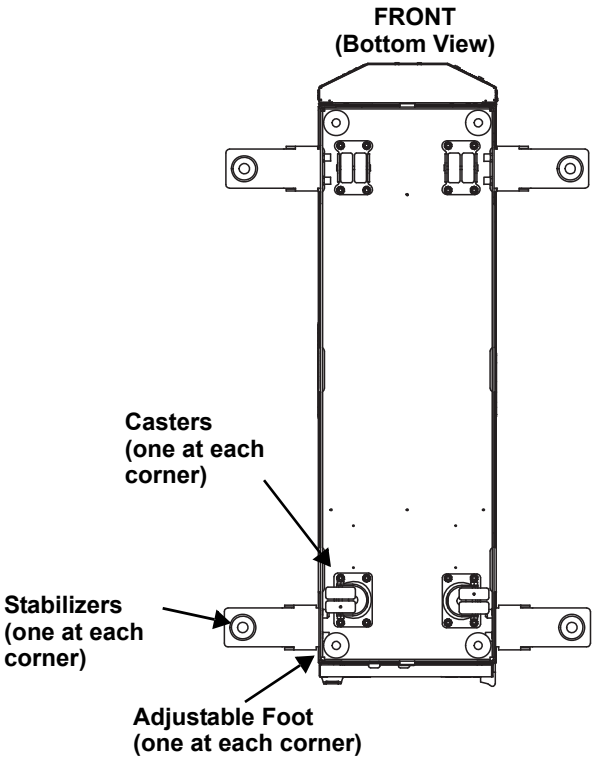
5.0 INSTALLING THE MODULE

5.1 Installing the Liebert XDH Within the Enclosure Row

Built-in casters allow rolling the Liebert XDH into position for installation. Stabilizers reduce the likelihood of the module tipping over. These stabilizers must be removed before the module is positioned in the row. Adjustable leveling feet prevent it from moving after positioning.

Once positioned, the Liebert XDH must be secured either to the floor with the included shipping brackets or to an adjacent cabinet. An adjustable bracket (Liebert P/N 187642G1) for attaching the Liebert XDH to an adjacent cabinet is included with each module.

Figure 9 Caster and stabilizer location



5.1.1 Install a Tie-Down Bracket—Optional

An optional tie-down bracket may be installed on the Liebert XDH to secure it in the row. The bracket keeps space between the Liebert XDH and adjacent equipment constant, preventing vibration.

What's Included

- Bracket: two-piece assembly
- M6 Bolt: 1
- M6 Nut: 1
- Washer: 1
- Self-tapping screws: 4

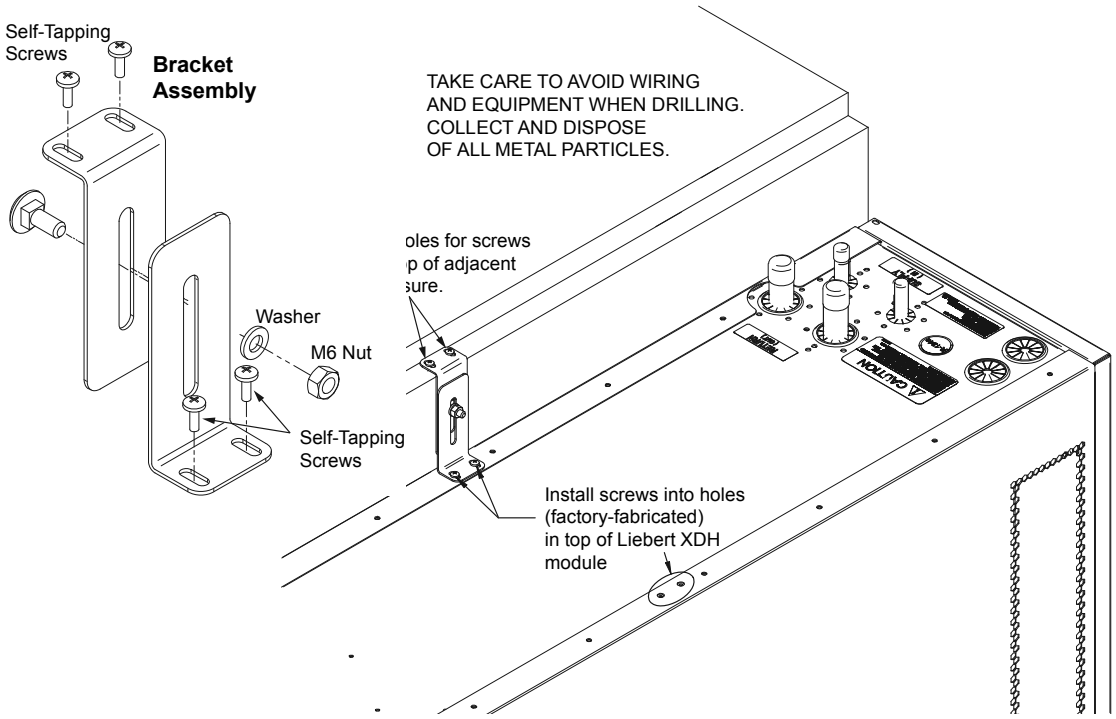
Tools Required

- Screwdriver: Phillips #2 Bit
- Drill
- Drill Bit: 1/8" diameter
- Adjustable wrench

To install the tie-down bracket:

1. Insert the M6 bolt through the longest slot in the tie-down bracket as shown in **Figure 10**.
2. Secure the tie-down bracket loosely with the washer and M6 nut.
3. Position the tie-down bracket on top of the Liebert XDH over the factory-fabricated holes and over the top of the adjacent enclosure as shown in **Figure 10**.
4. Mark the places where two self-tapping screws will attach the tie-down bracket to the adjacent cabinet.
5. Taking proper precautions to collect the metal shavings and protect equipment, drill holes in the adjacent cabinet for the two screws.
6. Use a vacuum cleaner or other method to remove all metal particles.
7. Position the bracket over the holes in the Liebert XDH and the adjacent cabinet.
8. Insert and tighten the four screws.
9. Tighten the M6 nut securely.

Figure 10 Install tie-down bracket


Self-Tapping Screws
Bracket Assembly
TAKE CARE TO AVOID WIRING AND EQUIPMENT WHEN DRILLING. COLLECT AND DISPOSE OF ALL METAL PARTICLES.
oles for screws
p of adjacent
sure.
Washer
M6 Nut
Self-Tapping Screws
Install screws into holes (factory-fabricated) in top of Liebert XDH module
CAUTION

5.1.2 Airflow Direction

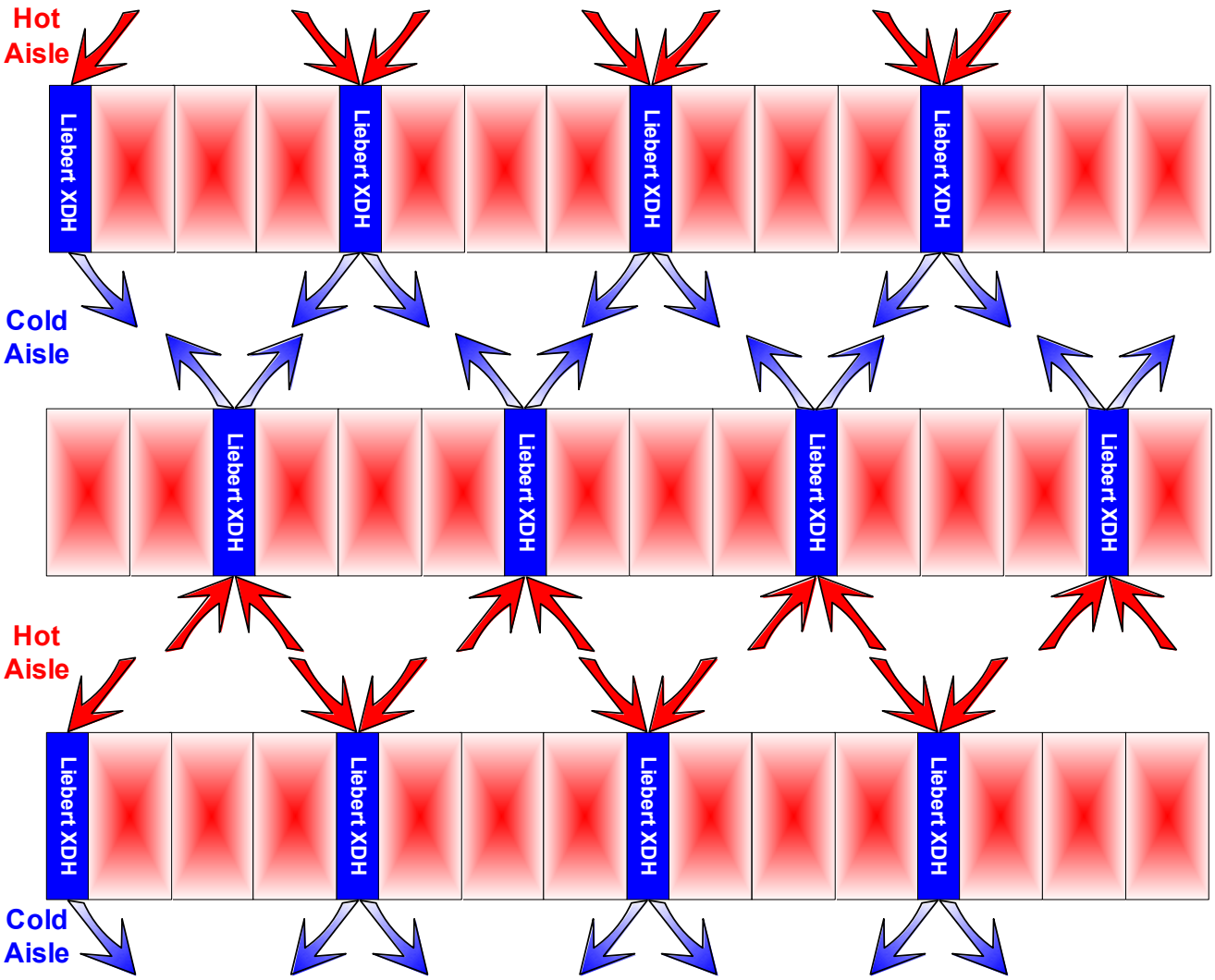
If the Liebert XDH is installed at the end of a row, Emerson recommends using uni-directional air diffusers. The uni-directional diffusers are designed to blow cooling air to the left; the diffusers can be used for right air discharge by removing them from the Liebert XDH, turning them 180 degrees, then reattaching them to the Liebert XDH.

If the Liebert XDH is installed between racks, Emerson recommends using bi-directional air diffusers. These diffusers blow air right and left, as well as to the front.

Two diffusers were shipped with the Liebert XDH. If uni-directional diffusers were ordered, the diffuser with the part number 186458G2 is designed for installation on the upper half of the Liebert XDH. The other diffuser, for use on the lower half of the Liebert XDH, has the part number 186459G2. When installed in these positions, the diffusers will direct the airflow to the left.

If directing the airflow in the opposite direction would improve cooling, the diffusers may be switched. See **Install Air Diffusers for Best Airflow Direction on page 15**.

Figure 11 Liebert XDH placement in enclosure row

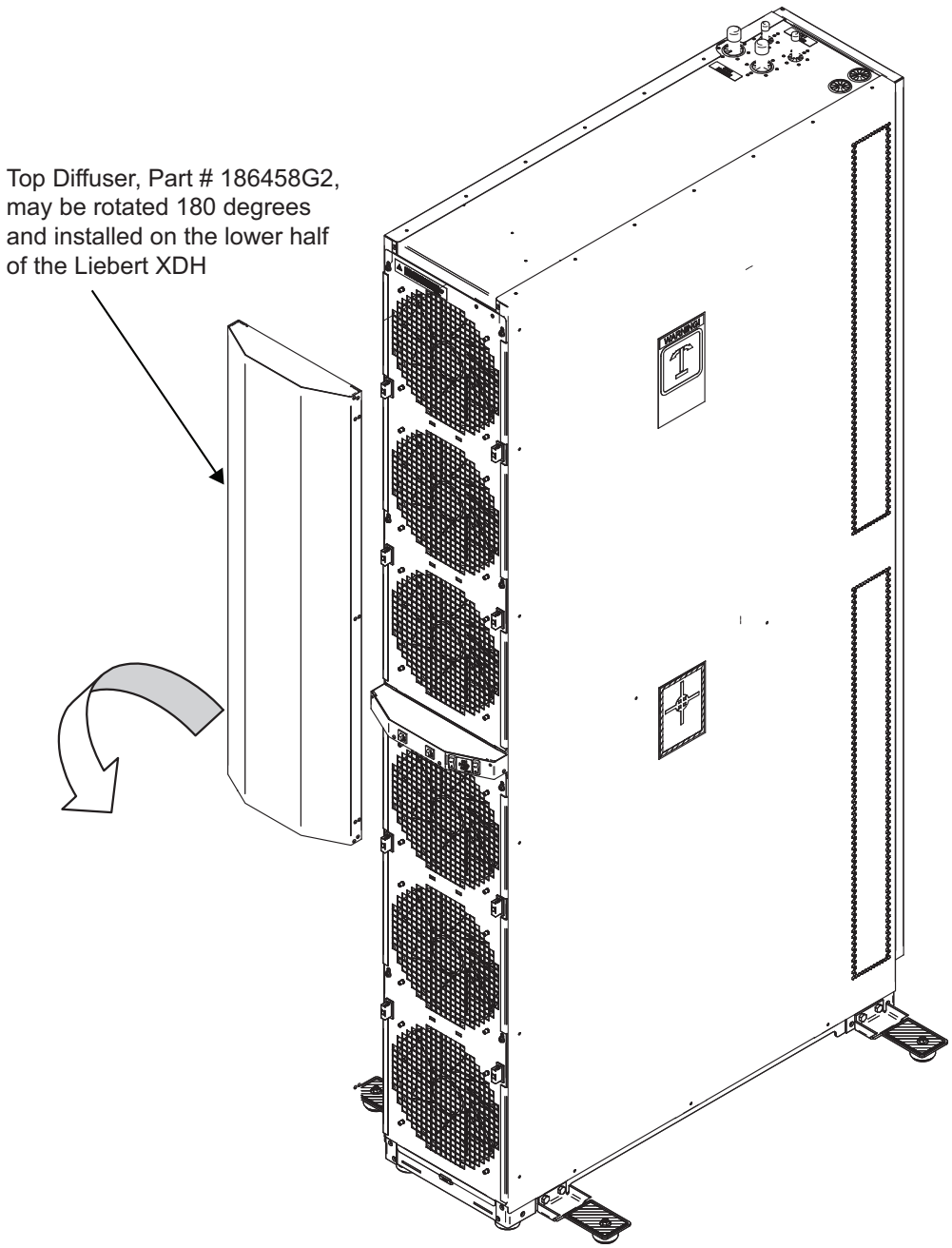


Install Air Diffusers for Best Airflow Direction

1. Remove the top diffuser, Part # 186458G2, from its packaging.
2. Check the top diffuser's fittings and insertion holes on the Liebert XDH to determine how the diffuser should be installed—the diffuser may be attached only one way on the top half of the Liebert XDH.
3. Rotate the diffuser 180 degrees and press it against the lower half of the Liebert XDH until it snaps into the fittings (see **Figure 12**).

   The vanes in the diffuser now point in the opposite direction.
4. Repeat **Steps 1** through **3** to install the bottom diffuser, Part # 186459G2, on the upper half of the Liebert XDH.

Figure 12 Change airflow direction



6.0 PIPING

Refer to site-specific drawings for general locations of the piping connections. These drawings should specify where the piping connects to the Liebert XDH.

6.1 European Union Fluorinated Greenhouse Gas Requirements

Stationary air conditioning, refrigeration, heat pump equipment and stationary fire protection systems in the European Community market and operating with fluorinated greenhouse gases (f-gas), such as R407C, R134a, R410A, must comply with the F-Gas Regulation: (EC) No. 842/2006 (F-gas). The regulation prohibits, among other actions, venting fluorinated greenhouse gases to the atmosphere.

The F-Gas Regulation requires operators to use all measures that are technically feasible and do not entail disproportionate cost to prevent leakage of these gases, to test for leakage regularly and to recover f-gas before disposing of equipment, as well as during service and maintenance.

Refer to the full regulation for additional details.

6.2 System Connection Configuration

If possible, connect the Liebert XDH's upper and lower refrigeration circuits to Liebert XDPs or Liebert XDCs in an interlaced configuration (see **Figure 13**). In an interlaced configuration, half the cooling modules in an aisle are connected to one Liebert XDP or Liebert XDC and the other half in that aisle are connected to another Liebert XDP or Liebert XDC. Interlacing the connection piping will keep one of the Liebert XDH's circuits operating and maintain even cooling should one of the Liebert XDP or Liebert XDC units fail.

However, if this is not possible, connect the Liebert XDH modules in a non-interlaced configuration (see **Figure 14**).

Figure 13 Typical Liebert XDH piping—interlaced connections

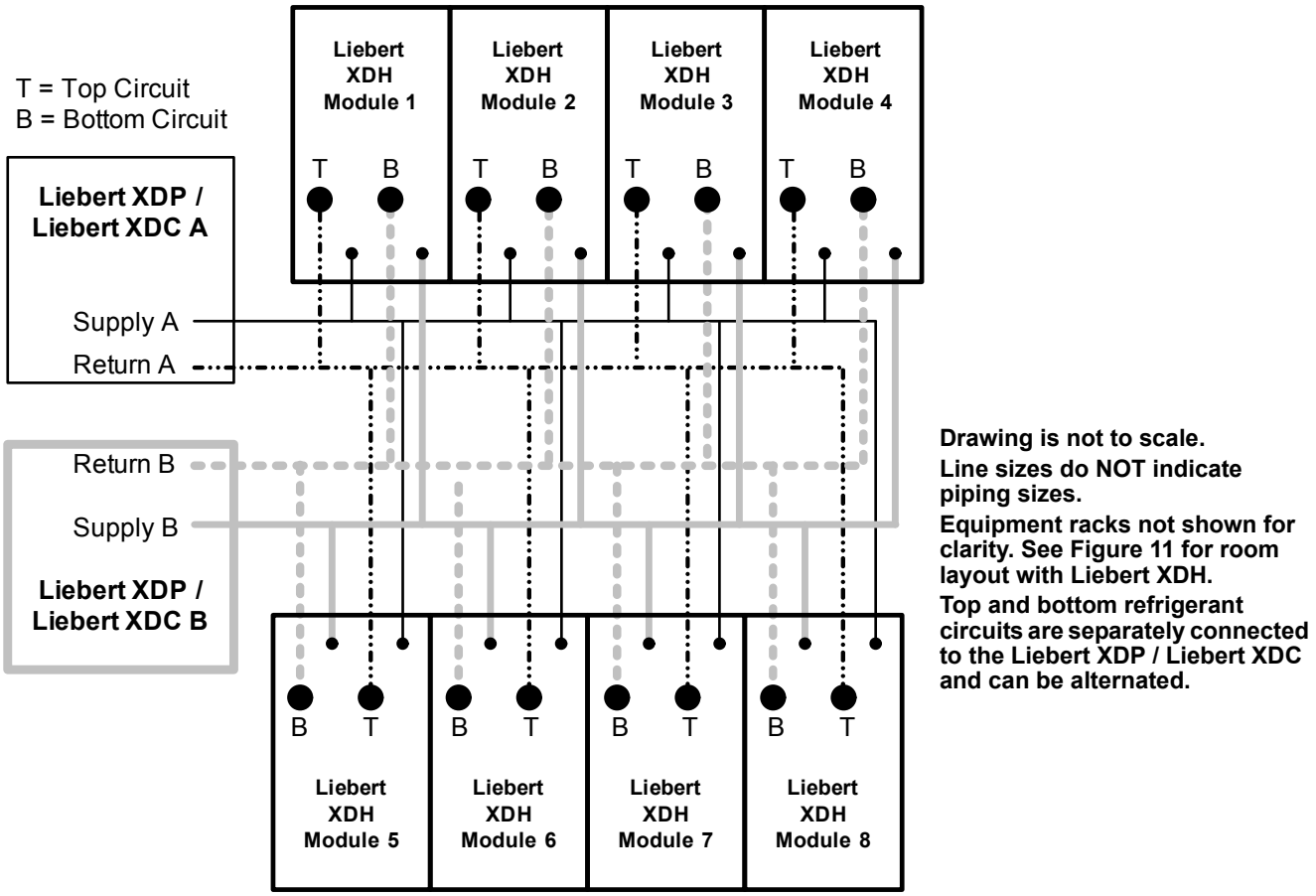
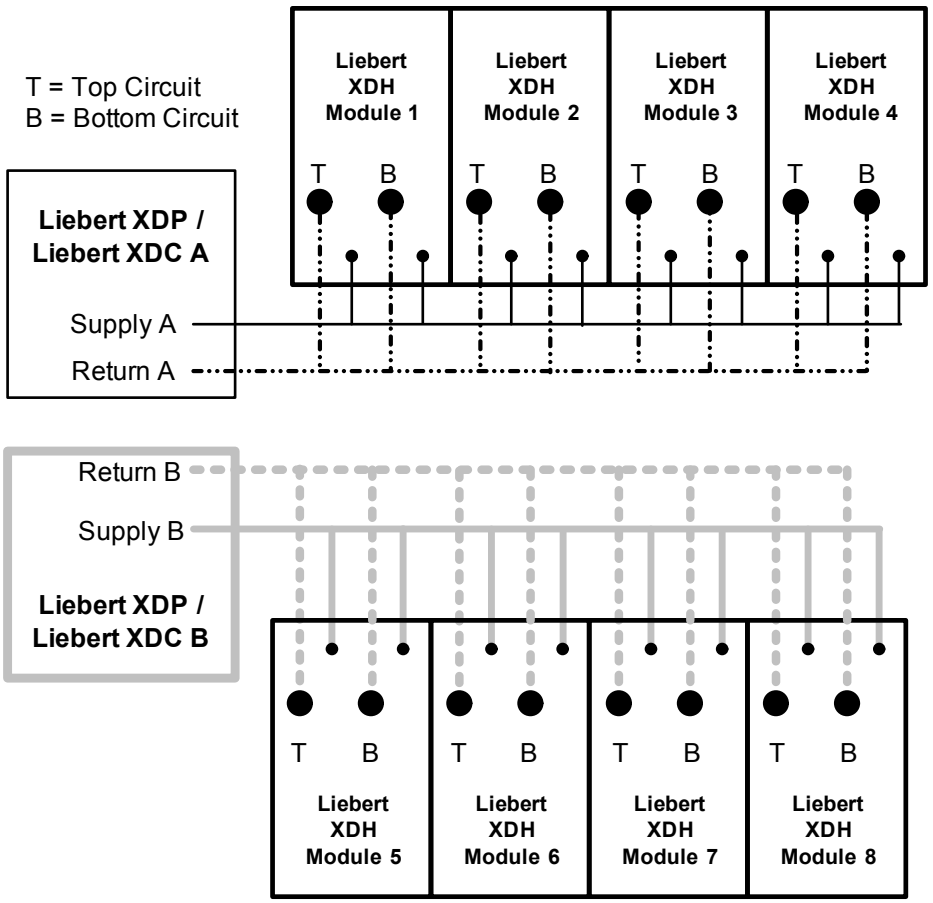

T = Top Circuit
B = Bottom Circuit
Liebert XDH Module 1
Liebert XDH Module 2
Liebert XDH Module 3
Liebert XDH Module 4
T B
Liebert XDP / Liebert XDC A
Supply A
Return A
Return B
Supply B
Liebert XDP / Liebert XDC B
B T
Liebert XDH Module 5
Liebert XDH Module 6
Liebert XDH Module 7
Liebert XDH Module 8
Drawing is not to scale.
Line sizes do NOT indicate piping sizes.
Equipment racks not shown for clarity. See Figure 11 for room layout with Liebert XDH.
Top and bottom refrigerant circuits are separately connected to the Liebert XDP / Liebert XDC and can be alternated.

Figure 14 Typical Liebert XDH piping—non-interlaced connection



Drawing is not to scale.
Line sizes do NOT indicate piping sizes.
Equipment racks not shown for clarity. See Figure 11 for room layout with Liebert XDH.
Top and bottom refrigerant circuits are separately connected to the Liebert XDP / Liebert XDC and can be alternated.

6.3 Connection Methods and Points

Refer to site-specific drawings for general locations of the piping connections. For Liebert XDH connection locations, refer also to **Figure 15**.

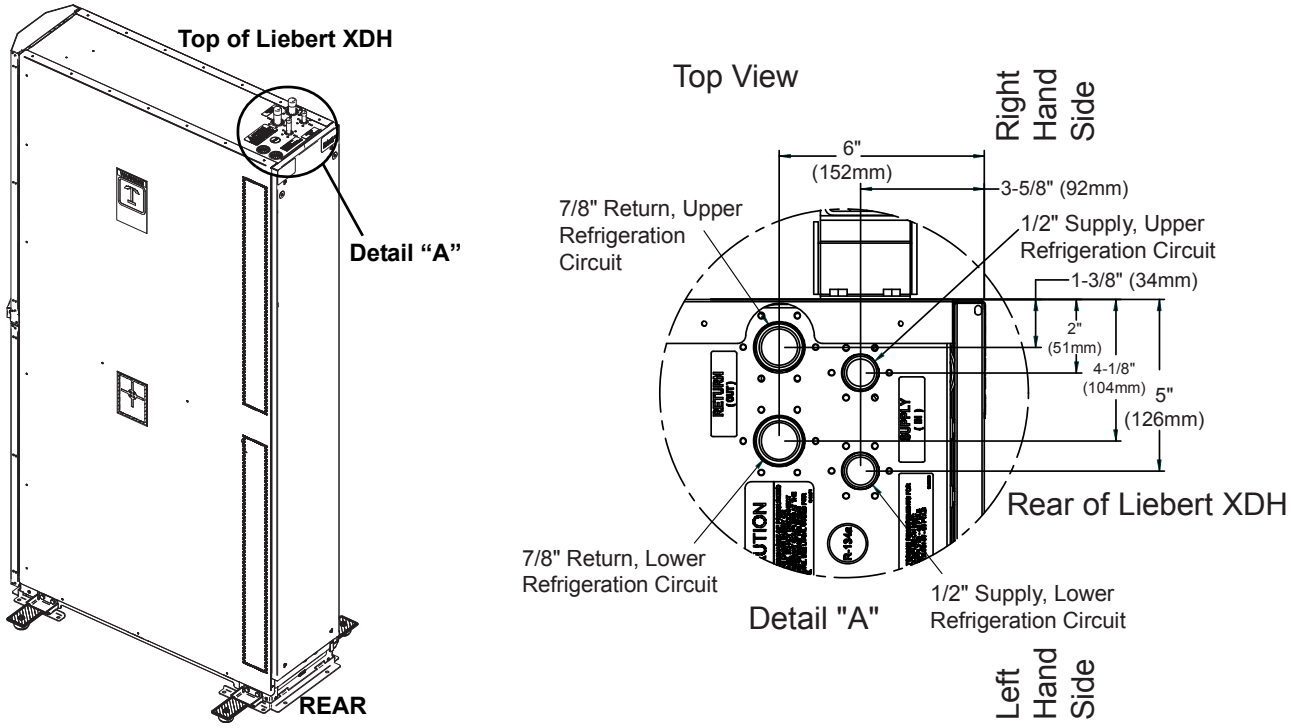
The assembly and connection means used for piping in the Liebert XD system are the same as those used in conventional refrigeration systems. Observe all standard practices during installation and startup to prevent damage and contamination. All piping must be ASTM Type ACR copper.

The Liebert XDH has supply and return piping access on the top of each module. Each Liebert XDH has two supply connections and two return connections, one set for each refrigerant circuit. Supply piping connection is 1/2" OD copper pipe, and return piping connection is 7/8" OD copper. The hard-piped XDH will have copper caps soldered in place and a low-pressure nitrogen holding charge.

Both supply and return fittings may be supplied with optional one-shot couplings. These couplings contain pressurized R-134a refrigerant inside the Liebert XDH. The Liebert XD Flex Pipe with one-shot couplings also contains pressurized R-134a refrigerant.

For Liebert XDHs with removable connections, the supply piping coupling is 1/2" OD and the return piping connection is 7/8" OD. Both the Liebert XDH and the Liebert XD Flex Pipe with removable couplings will have copper caps soldered in place and a low-pressure nitrogen holding charge.

Figure 15 Supply and return—hard-piping connections



6.4 Insulation

To minimize the possibility of condensation, insulate all piping between the Liebert XDH and the Liebert XDP or Liebert XDC.

6.5 Venting the Holding Charge for Hard-Piped or Removable Liebert XD Flex Pipe Connections

The Liebert XDH in either hard-piped configuration or with removable couplings is shipped with a low-pressure holding charge (about 30 psi) of nitrogen to prevent oxidation and moisture. This must be vented from the upper and lower refrigeration circuits before removing the copper caps.

NOTE

This procedure is for modules with hard-piped or removable couplings ONLY. Do not vent a pre-charged Liebert XDH or pre-charged Liebert XD Flex Piping.

To vent the holding charge:

1. Find the four Schrader valves that retain the nitrogen holding charge in the Liebert XDH. Three are near the top of the Liebert XDH; one Schrader valve is in the bottom half of the Liebert XDH.
2. Vent the holding charge in the circuits by depressing the pin in a Schrader valves on either the supply or return line for each circuit (see Detail A in **Figure 15**).
3. Replace and secure the cap on the Schrader valve that was opened.

6.6 Brazing Preparations

The assembly and connection means used for piping in the Liebert XD system are similar to those used for conventional refrigeration systems. All piping should be installed with high-temperature brazed joints. Soft soldering is not recommended.

After the holding charge has been vented and before brazing, wrap a wet rag around the copper couplings before removing the caps to prevent internal component damage. A torch can be used to remove the caps over the ends of the supply and return lines.

During brazing, the lines must be filled with flowing dry nitrogen to prevent excessive oxidation and scale formation inside the piping. Prevailing good refrigeration practices must be employed for piping supports, leak testing, dehydration and charging. Failure to use good system practices may result in damage to the system. Refer to the ASHRAE refrigeration handbook for general good-practice refrigeration.

6.7 Recommended Piping Size

NOTICE

Risk of oversized piping. Can require the use of excess refrigerant.

To minimize the amount of refrigerant required, do NOT oversize the piping.

Connect the main pipes between the Liebert XDH branch piping and the Liebert XDP or Liebert XDC according to **Table 2**. Elbows and restrictions must be minimized to ensure good fluid flow.

See **Table 2** below for recommended pipe sizes and **Figure 3** for piping segment locations.

Table 2 Branch piping sizes for pumped refrigerant loop

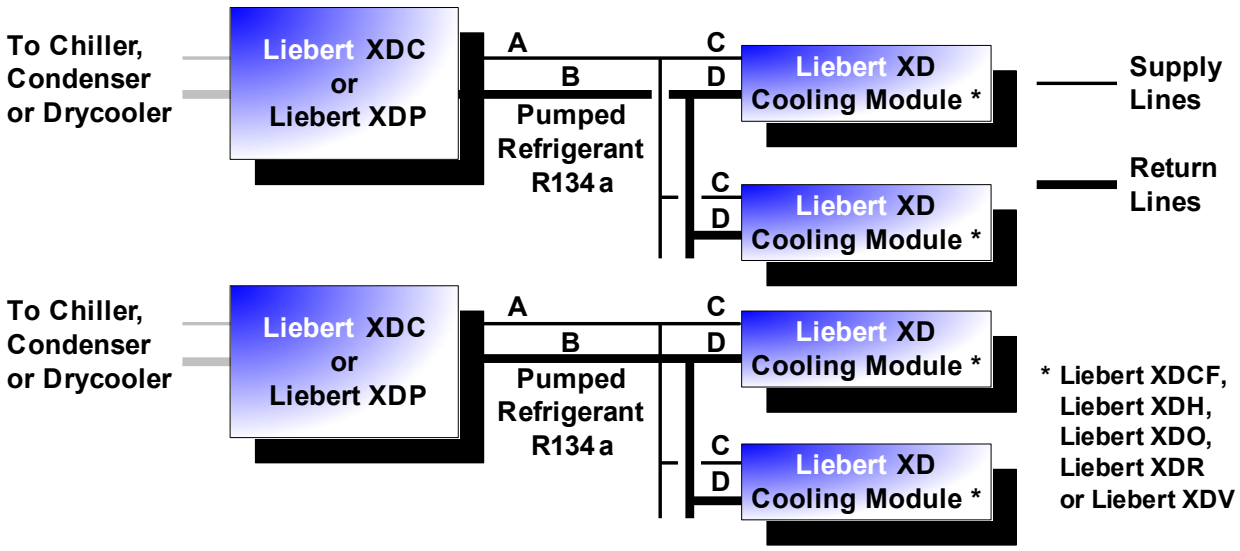
Pipe Function	Key to Piping in Figure 16	Size / Equivalent Pipe Length
Liebert XDP supply line, from Liebert XDP supply to farthest Liebert XD cooling module	A	1-1/8" OD for lengths up to 60 feet (18.3m)
		1-3/8" OD for lengths more than 60ft. (18.3m) but less than 175ft. (53m)
Liebert XDP return line, from farthest Liebert XD cooling module to Liebert XDP return	B	2-1/8" OD for lengths up to 60 feet
		2-5/8" OD for lengths more than 60ft. (18.3m) but less than 175ft. (53m)
Supply Line Drop from the Supply Main to the Liebert XDH	C	1/2" OD (0.430" ID) for lengths up to 10 feet (3m)
		1/2" OD (0.430" ID) for lengths up to 10 feet (3m)
Return Line Drop from the Liebert XDH to the Return Main	D	7/8" OD(0.545" ID) for lengths up to 10 feet (3m)
		1-1/8" OD(1.025" ID) for lengths more than 10 but less than 25ft. (3-7.6m)

NOTE

To minimize the amount of pumped refrigerant required, do NOT oversize the piping.

See **Figure 17** for piping recommendations for hard-piping between the Liebert XDH and the header system.

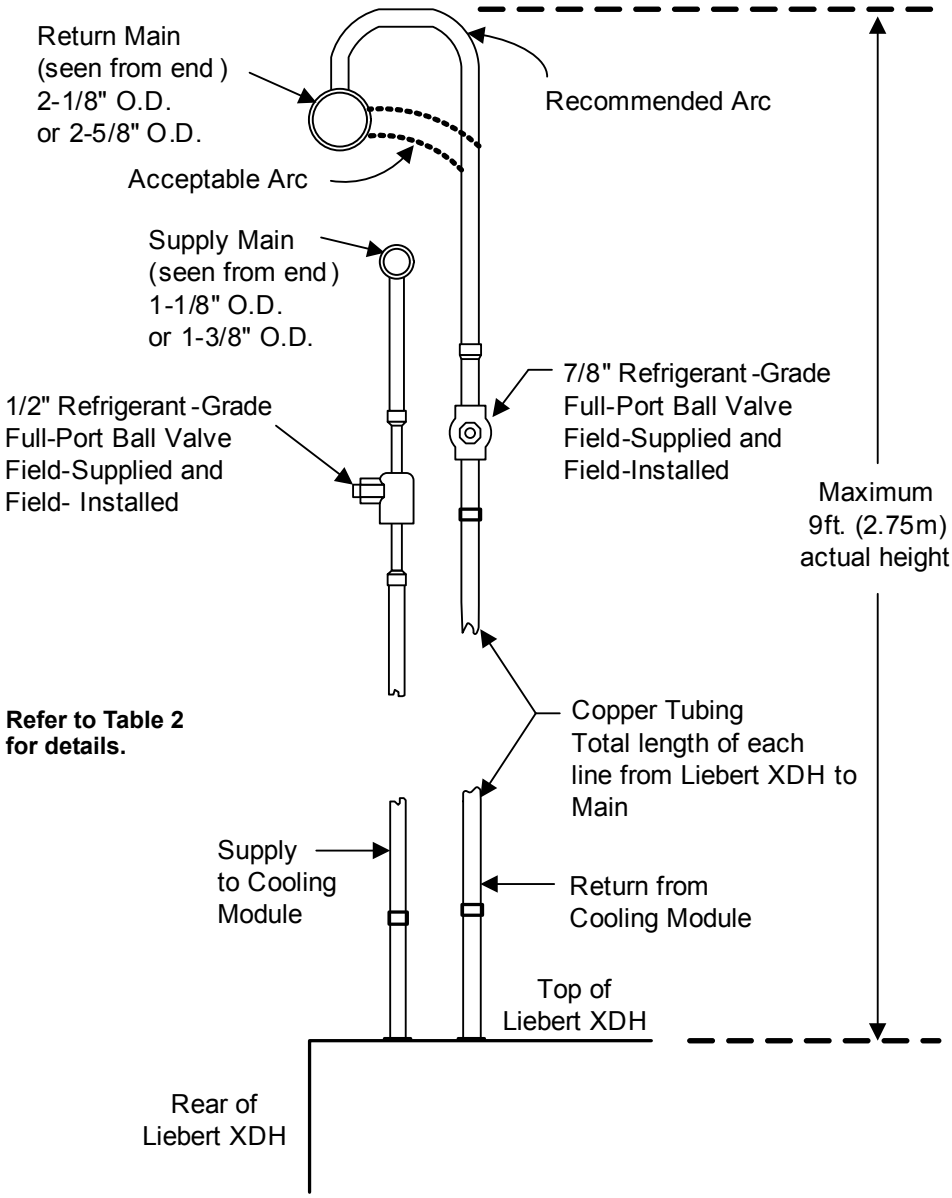
Figure 16 Generic piping layout



6.8 Hard-Piped Connection Sizes

The supply piping for each refrigeration circuit is 1/2" OD copper pipe. The return piping for each circuit is 7/8" OD copper. Liebert XDHs that are intended for hard-piped connections will have copper caps soldered in place and a holding charge of nitrogen.

Figure 17 Hard-piped connection diagram



6.9 Liebert XD Piping Slope

The main supply and return lines to and from the Liebert XDP/XDC must be sloped downward toward the Liebert XDP/XDC at a rate of 1-2" per 20 feet (25-51mm per 6m) of pipe run. Horizontal connector lines should also be sloped downward from the cooling modules toward the main supply and return lines.

6.10 Piping Details - Shutoff / Isolation Valves

To allow for fluid isolation of each Liebert XDH module, install a full port isolation valve (field-supplied) on each branch circuit, see **Figure 17**, site-specific documentation, Liebert Xtreme Density System Design Manual, SL-16655, and documentation for other parts of the system.

6.11 Leak Checking and Evacuation

Refer to the Liebert XDC or Liebert XDP user manual for procedures for evacuation, leak check, charging and startup.

6.12 Header System

The Liebert XDH module system with optional flexible piping requires use of the Liebert XD prefabricated piping assembly. The prefabricated piping is compatible with the Liebert XD Flex Pipe required to attach to the Liebert XDH modules. For the details on piping connection locations, see **Figure 19**.

For additional information, refer to the Liebert Xtreme Density System Design Manual, SL-16655, available at the Liebert Web site:

www.liebert.com

6.13 Field Installation of Liebert XD Flex Pipe Kit on Liebert XDH

If you are not performing a service installation or a field retrofit, skip this section and proceed with the instructions in **6.13.5 - Connect a Liebert XDH with Liebert XD Flex Pipe to a Liebert XD System**.

Liebert XD Flex Pipe kits are available in lengths of 4, 6, 8 and 10 feet (1.2, 1.8,2.4 and 3 meters). Connection style to the module end may be straight or 90 degrees with one-shot or removable couplings. Connection to the prefab piping assembly is a threaded coupling. For data on acquiring the correct kit for your installation, see **Table 11**.

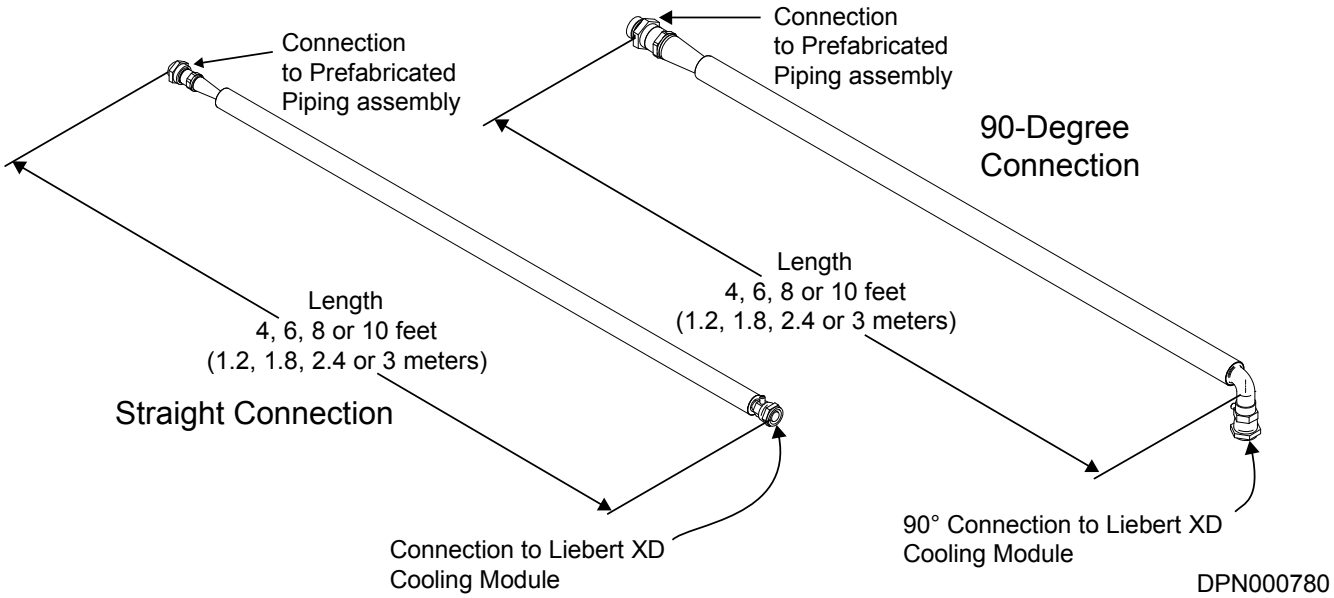
The Liebert XD Flex Pipe should be connected to the Liebert XD module, then to the header system to ease installation and prevent twisting the Liebert XD Flex Pipe.

NOTICE

Risk of kinked Liebert XDV Flex Pipes. Can cause permanent damage and leaks in the Liebert XDV Flex Pipes.

Do not fold or bend pipe tightly.

Figure 18 Liebert XD Flex Pipe dimensions—straight and 90-degree connections


Connection to Prefabricated Piping assembly
Length 4, 6, 8 or 10 feet (1.2, 1.8, 2.4 or 3 meters)
Straight Connection
Connection to Liebert XD Cooling Module
Connection to Prefabricated Piping assembly
90-Degree Connection
Length 4, 6, 8 or 10 feet (1.2, 1.8, 2.4 or 3 meters)
90° Connection to Liebert XD Cooling Module
DPN000780

6.13.1 Connecting Methods—One-Shot Couplings for Pre-Charged Refrigerant Option

CAUTION

Risk of sudden refrigerant discharge. Can cause loss of charge and minor injury.

If the optional pre-charged option is chosen, the Liebert XDH is shipped with a full charge of R-134a refrigerant under pressure. Do not remove the pipe caps or plugs before the module is ready for connection to Liebert XD Piping.

Supply and return couplings on the pre-charged Liebert XDH modules are one-shot couplings. Do not disconnect one-shot couplings after they have been connected. Disconnection will release pressurized R-134a refrigerant from the Liebert XDH.

Do not remove the pipe caps or plugs before the module is ready for connection to the Liebert XD Flex Pipe. The Liebert XDHs with the pre-charged option are equipped with one-shot couplings. The module and the Liebert XD Flex Pipe contain a charge of R-134a refrigerant under pressure. This charge must not be vented.

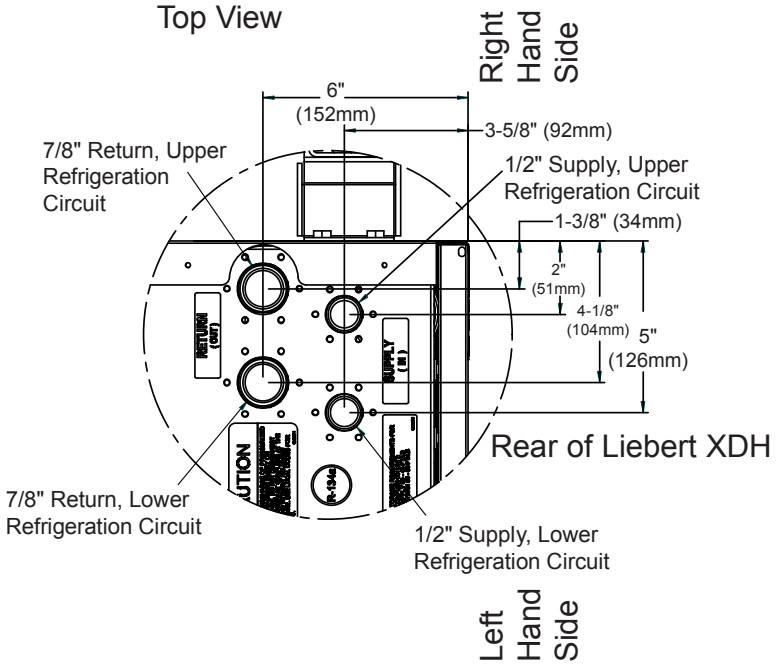
Do not disconnect the one-shot Liebert XD Flex Pipes after they have been connected to the module.

The assembly and connection means used for piping in the Liebert XD system are the same as those used in conventional refrigeration systems. Observe all standard practices during installation and startup to prevent damage and contamination.

If the module includes the optional, factory-installed, one-shot style couplings, proceed with **6.13 - Field Installation of Liebert XD Flex Pipe Kit on Liebert XDH** and see **Figure 19**.

If the module does not include Liebert XD Flex Pipes, refer to **6.5 - Venting the Holding Charge for Hard-Piped or Removable Liebert XD Flex Pipe Connections**.

Figure 19 Piping location and connecting sizes for pre-charged modules



6.13.2 Connect a Liebert XDH with One-Shot Couplings to Liebert XD Flex Pipe

NOTICE

Risk of improper reuse of Liebert XD Flex Pipes with one-shot couplings. Can cause refrigerant leaks.

Liebert XD Flex Pipes with one-shot couplings must not be removed from the Liebert XDH unless they are being replaced with Liebert XD Flex Pipes with one-shot couplings. Do not reuse Liebert XD Flex Pipes with one-shot couplings. Reuse may result in refrigerant leaks.

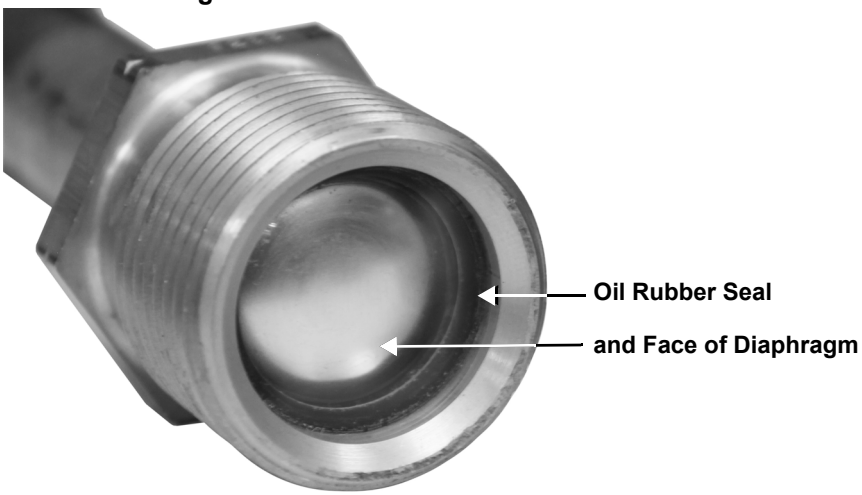
Tools Required

- One adjustable wrench with a maximum adjustment size of 2 inches
- One torque wrench, half-inch drive (see **Table 3** for sizes)

This operation must be performed on each of the two circuits in the Liebert XDH.

1. Check the Liebert XD Flex Pipe for proper length.
2. Remove the protector cap and plug from the couplings and carefully wipe the couplings and threaded surfaces clean.
3. Use a small applicator brush saturated with refrigerant oil to lubricate the entire surface of the diaphragm, the O-ring and the threaded area of male coupling assembly. Refer to **Figure 20**.

Figure 20 Male coupling on Liebert XD cooling module



If refrigerant oil is not used, an alternate lubricant for this application is a refrigerant-compatible silicone grease product, such as Dow Corning DC200/60,000 cst.

4. Thread the coupling halves together by hand to ensure that the threads mate properly. Ensure that the Schrader valve is oriented so that it is accessible for service.

Figure 21 Female one-shot coupling Liebert XD Flex Pipe: Schrader valve location

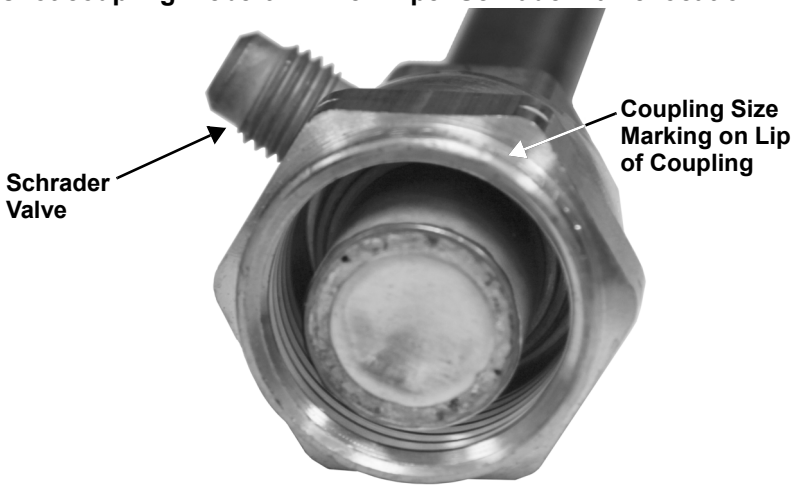
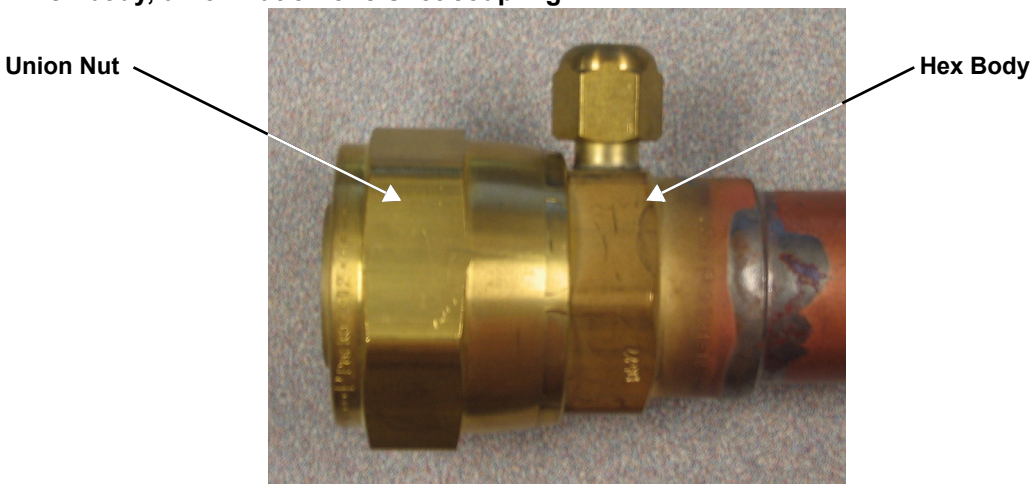


Figure 22 Hex body, union nut on one-shot coupling



NOTICE

Risk of improper tightening. Can cause equipment damage.

It is imperative that the brass body on the Liebert XD Flex Pipe coupling does not rotate while the union nut is being tightened. If the brass body rotates, it may damage the Liebert XD Flex Pipe.

5. Hold the brass body of the Liebert XD Flex Pipe with a wrench so that it does not rotate and use the torque wrench to tighten the union nut to the proper value shown in **Table 3**.

Table 3 Torque and wrench size for connecting Liebert XDH with one-shot couplings to Liebert XD Flex Pipe

Coupling Size	Wrench Sizes, in. (mm)	Torque, Union Nut Only, ft-lb (Nm)
	Union Nut	
#10	1-5/16 (34)	35-45 (13.5- 16.2)
#11	1-5/6 (47)	35-45 (47.5- 61.0)
#12	1-3/8 (35)	50-60 (67.8- 88.1)

If a torque wrench is not available, continue with the steps below.

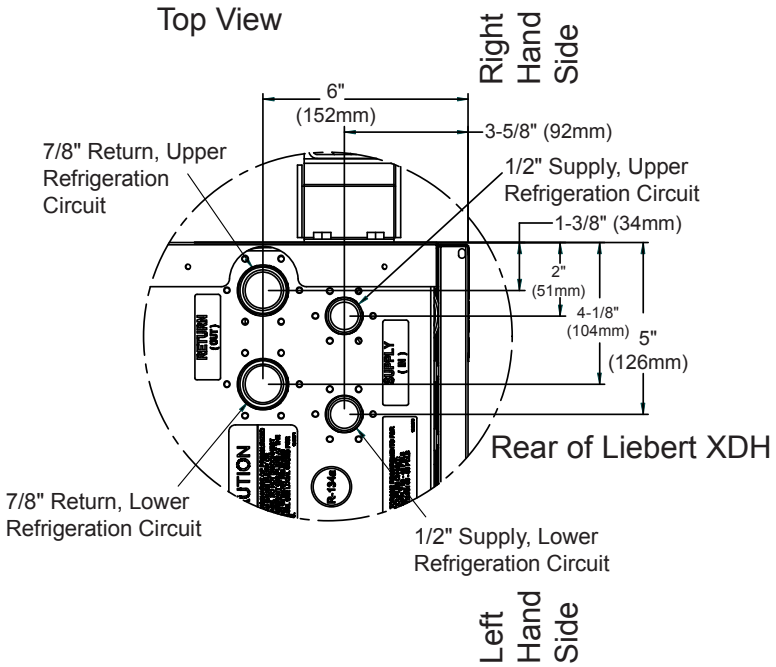
6. Tighten the union nut on the Liebert XD Flex Pipe to the coupling on the module with the proper-sized wrench until a definite resistance is felt, metal-to-metal contact.
7. Use a marker or pen to draw a line lengthwise across the module coupling to the Liebert XD Flex Pipe. The line should parallel the Liebert XD Flex Pipe.
8. Tighten the nuts an additional one (1) wrench flat (60°), judging the amount by the mark drawn in **Step 7**.

6.13.3 Connection Methods—Removable Couplings

The assembly and connection means used for piping in the Liebert XD system are the same as those used in conventional refrigeration systems. Observe all standard practices during installation and startup to prevent damage and contamination.

Both supply and return couplings may be supplied with optional, removable couplings.

Figure 23 Piping location and connecting sizes for pre-charged modules



6.13.4 Connect Liebert XD Flex Pipe with Removable Coupling to a Liebert XD Cooling Module

Tools Required

- One adjustable wrench with a maximum adjustment size of 2 inches
- One torque wrench, half-inch drive (see **Table 4** for sizes)

1. Check the Liebert XD Flex Pipe for proper length.
2. Remove the protector plugs from the Liebert XD Flex Pipe.
3. Remove the protector cap from the couplings on the module.
4. Wipe the couplings and threaded surfaces clean of particles and other foreign substances.
5. Verify the O-ring is in place on the module coupling. Should additional O-rings be required, refer to **Table 5**.
6. Place the Liebert XD Flex Pipe assembly so that the flat face of the flange on the Liebert XD Flex Pipe coupling comes into contact with the O-ring on the module coupling.
7. Thread the coupling halves together by hand to ensure that the threads mate properly.

Table 4 Torque and wrench sizes for connecting Liebert XD Flex Pipe to the Liebert XDH with removable couplings

Coupling Size	Wrench Size, in. (mm)	Torque, Union Nut Only, ft-lb (Nm)
	Union Nut	
1/2"	15/16 (24)	40 (55)
5/8"	1-1/8 (29)	60 (80)
1"	1-5/8 (41)	110 (150)

If a torque wrench is not available, continue with the steps below.

8. Hold the Liebert XD Flex Pipe so that it does not rotate and use the torque wrench to tighten the union nut to the proper value shown in **Table 4**.
9. Tighten the union nut on the Liebert XD Flex Pipe to the coupling on the module with the adjustable wrench until a definite resistance is felt.
10. Use a marker or pen to draw a line lengthwise across the module coupling to the Liebert XD Flex Pipe. The line should parallel the Liebert XD Flex Pipe.
11. Tighten the nuts an additional quarter-turn, judging the amount by the mark drawn in **Step 10**.

Figure 24 Removable couplings

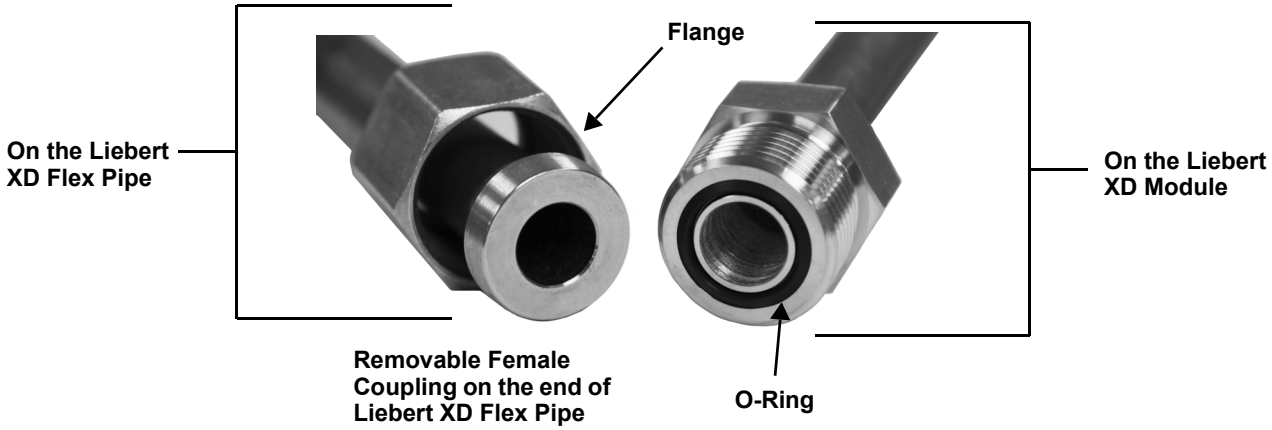

Flange
On the Liebert XD Flex Pipe
On the Liebert XD Module
Removable Female Coupling on the end of Liebert XD Flex Pipe
O-Ring

Table 5 O-ring part number

Liebert Part #	Size, in.	Coupling
192917P1	1/2	FD57-1224-08-10
192917P2	5/8	FD57-1224-10-11
192917P3	7/8	FD57-1224-14-12

6.13.5 Connect a Liebert XDH with Liebert XD Flex Pipe to a Liebert XD System

NOTICE

Risk of refrigerant loss. Can cause environmental pollution and equipment malfunction.

Before connecting the Liebert XDH with Liebert XD Flex Pipe to the prefabricated piping mains, check the whole system for leaks.

Check the Liebert XDH to ensure that the module has no refrigerant leaks.

Read all instructions before beginning installation.

Tools Required

- One adjustable wrench with a maximum adjustment size of 2 inches
- One torque wrench, half-inch drive
- Crowsfoot (supplied with Liebert XDP and Liebert XDC)
- Liebert XDP or Liebert XDC user manual

NOTE

This operation requires two or more people.

1. Determine the port location of the supply and return piping overhead.
2. Make sure the service valve for each port is closed.
3. Remove caps from only the required ports. Do not remove caps from the unused ports.
4. Remove the pipe plugs that are supplied on the Liebert XD Flex Pipe.
5. Inspect both halves of the couplings and remove any foreign contamination from the sealing surfaces and threads before connecting the couplings.
6. Determine the coupling size by locating the number scribed on the Liebert XD Flex Pipe coupling. See **Figure 25**.

Figure 25 Coupling size indicator

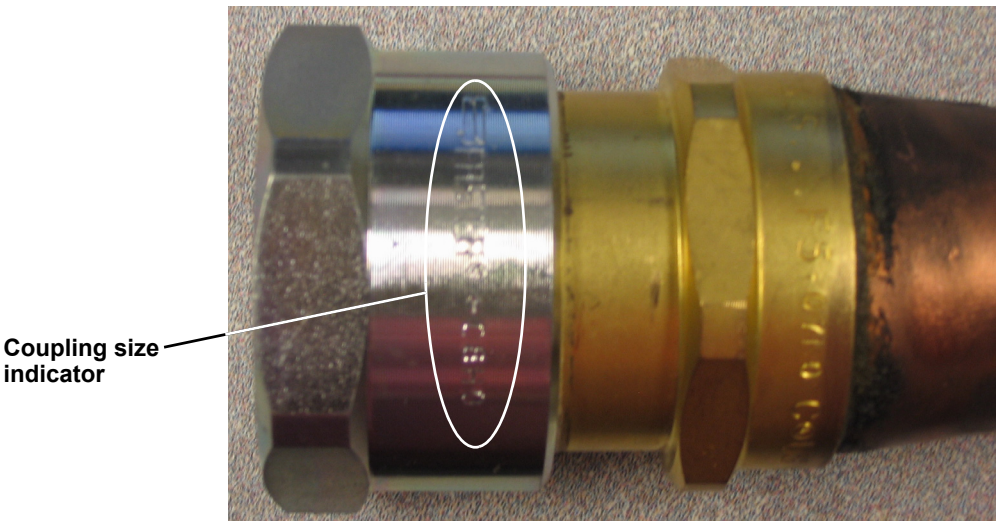
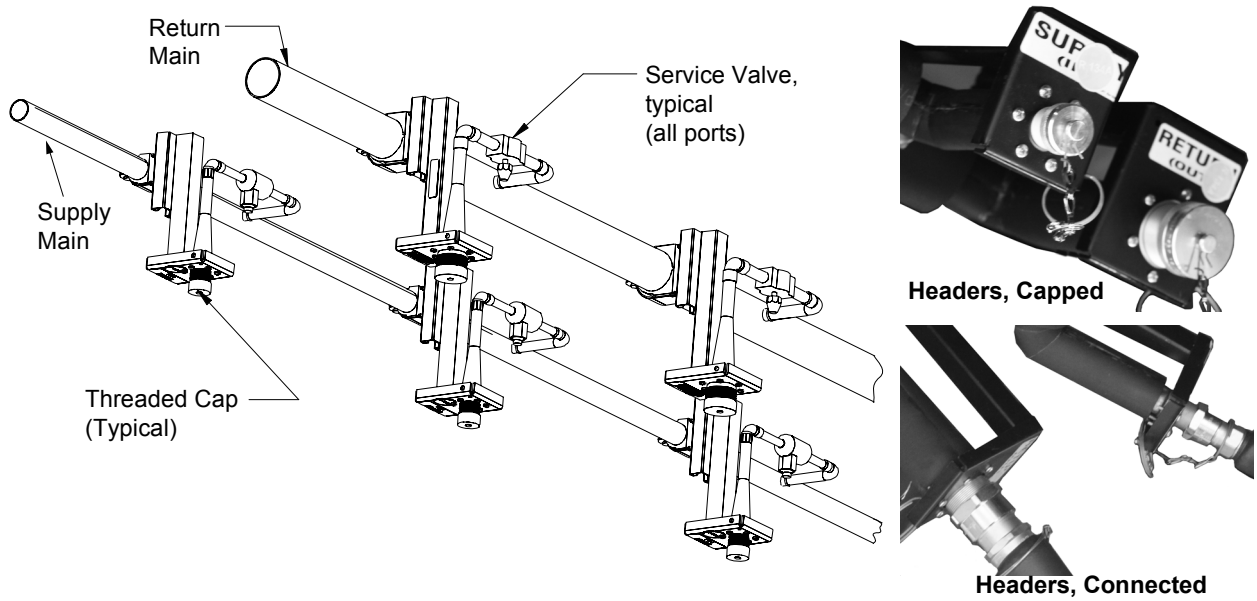
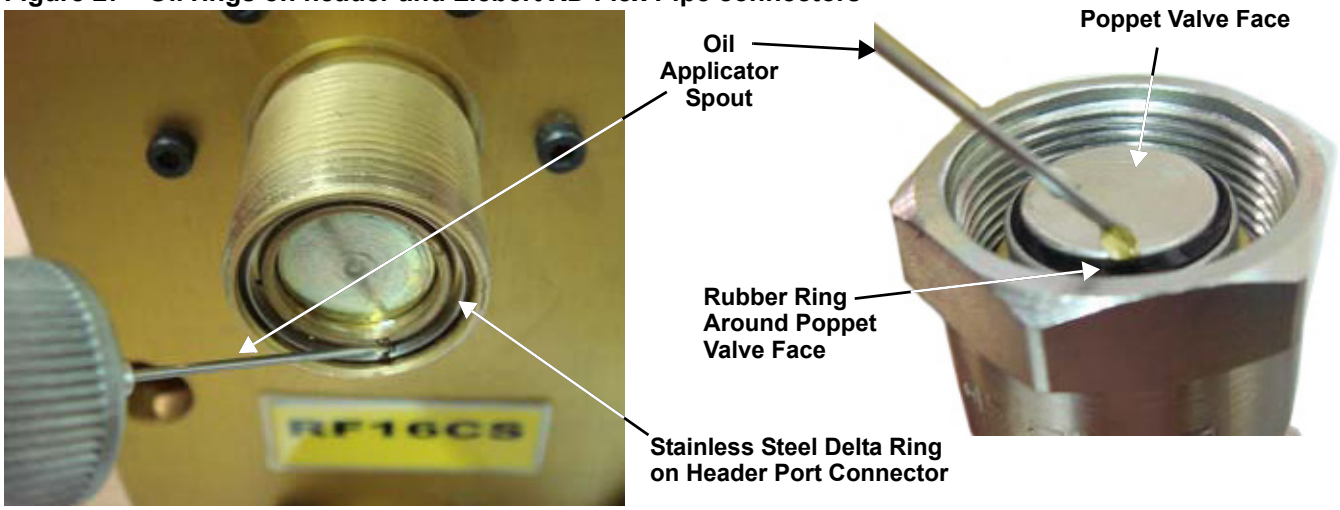


Figure 26 Liebert XD prefabricated piping assembly



7. Use mineral oil or polyol ester oil to lubricate the face of the poppet valve and the seal around the poppet valve on the female coupling (on the Liebert XD Flex Pipe) (see **Figure 27**).
8. Apply mineral oil or polyol ester oil to the stainless steel delta ring on the male coupling (header port connector) (see **Figure 27**).

Figure 27 Oil rings on header and Liebert XD Flex Pipe connectors


Oil Applicator Spout
Poppet Valve Face
Rubber Ring Around Poppet Valve Face
Stainless Steel Delta Ring on Header Port Connector

9. Thread the union nut of the Liebert XD Flex Pipe coupling onto the port coupling to ensure the threads mate properly.
10. Using the wrench arrangement shown in **Figure 28**, torque the couplings to the values in **Table 6**.

NOTICE

Risk of twisted or kinked piping. Can cause flow restriction or leaks.

It is imperative that the brass body on the Liebert XD Flex Pipe coupling does not rotate while the union nut is being tightened. If the brass body rotates, it may damage the Liebert XD Flex Pipe.

Table 6 Torque for connecting Liebert XD Flex Pipe to prefabricated piping

Coupling Size	Crowsfoot Size, in. (mm)	Torque, ft-lb (Nm)
1/2"	1-3/16 (30)	25.8 (30-35)
3/4"	1-5/8 (41)	48.0 (60-65)
1"	1-31/32 (50)	62.7 (80-85)

Figure 28 Wrench arrangement for tightening couplings

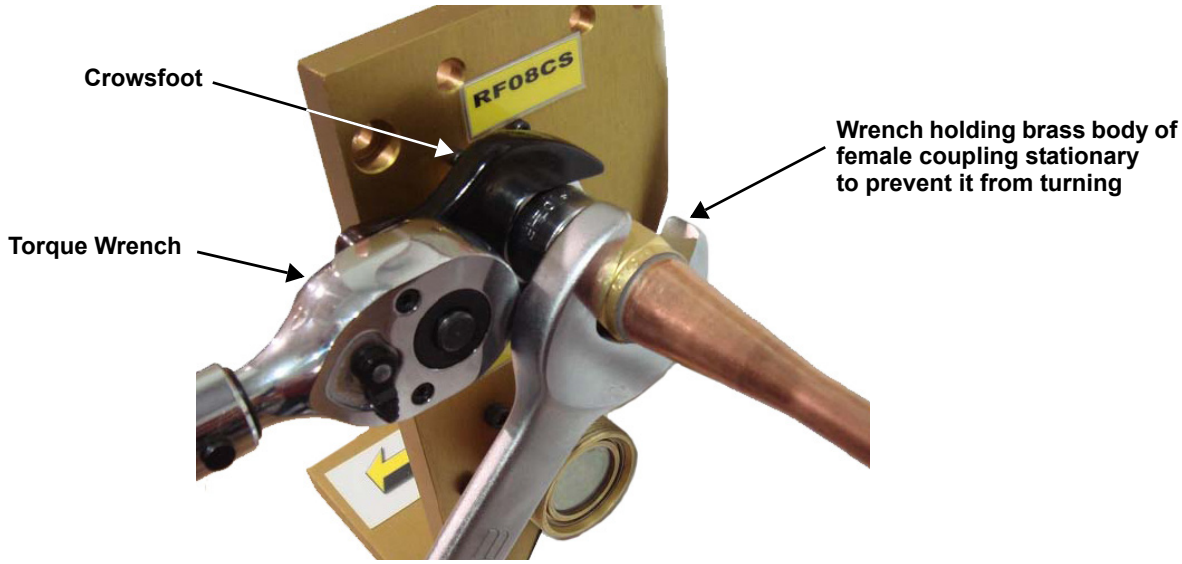
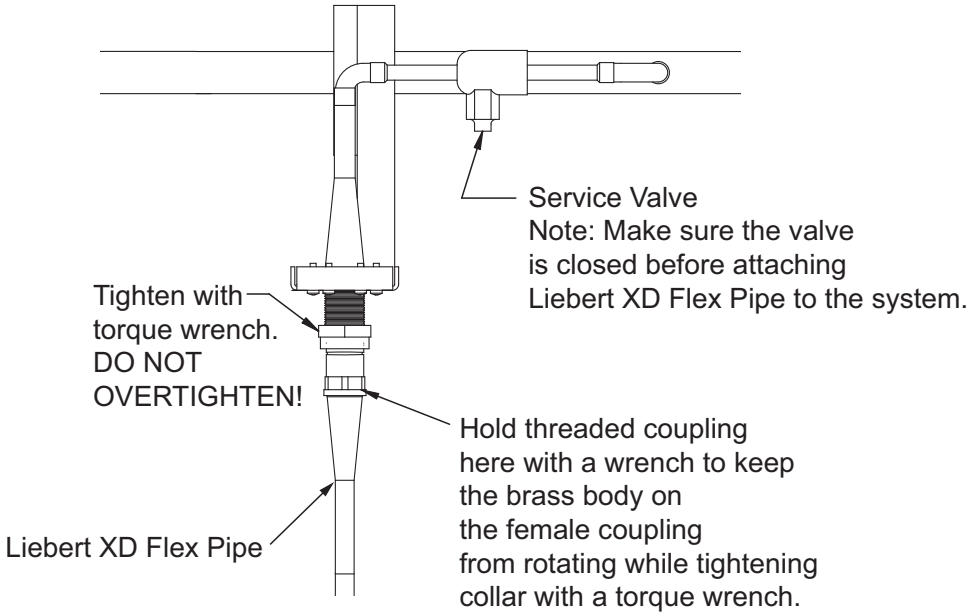


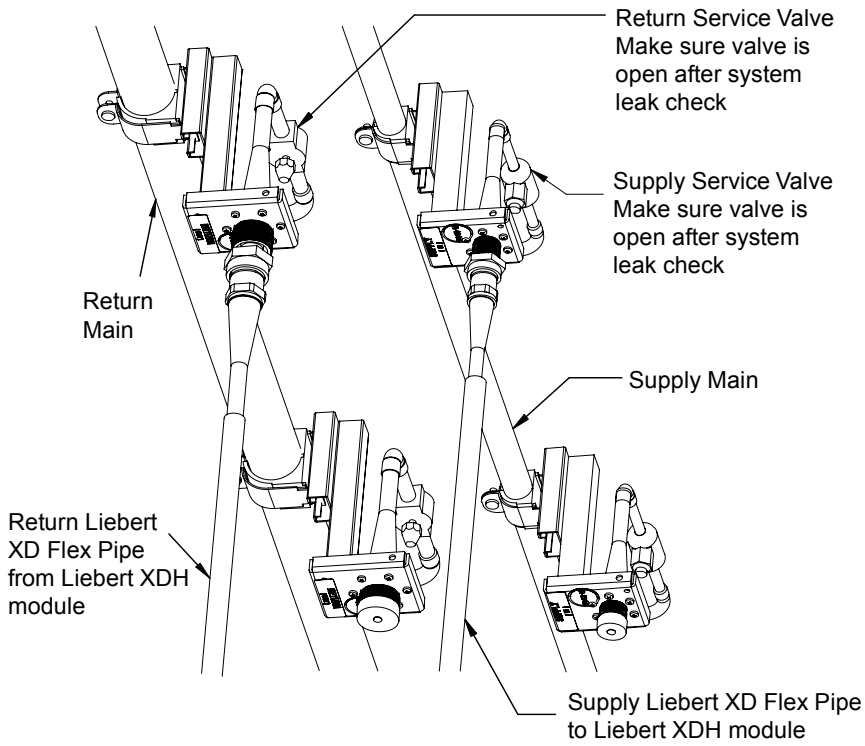
Figure 29 Detail view of Liebert XD Flex Pipe and prefabricated piping port


Service Valve
Note: Make sure the valve is closed before attaching Liebert XD Flex Pipe to the system.
Tighten with torque wrench. DO NOT OVERTIGHTEN!
Hold threaded coupling here with a wrench to keep the brass body on the female coupling from rotating while tightening collar with a torque wrench.
Liebert XD Flex Pipe

11. Repeat **Steps 3** through **10** for the remaining Liebert XD Flex Pipe.
12. Once the supply and return connections are completed, check to make sure the Liebert XDH fan power switches are Off, then connect the power cords to their power sources.
13. Turn the fan switches On. Ensure that the fans operate.
14. Proceed with **Step a**, **b** or **c** below, depending on your installation:
    a. **For a non-operational Liebert XD system and Liebert XDHs NOT pre-charged:**
        1. Open the return service valve first, then open the supply service valve.
        2. Refer to the Liebert XDC or Liebert XDP user manual for procedures for evacuation, leak check, charging and startup.
        3. With the Liebert XDH fans operating, cool air is discharged from the Liebert XDH.
    b. **For a non-operational Liebert XD system and Liebert XDHs pre-charged:**
        1. Refer to the Liebert XDC or Liebert XDP user manual for procedures for evacuation, leak check, charging and startup.
        2. With the Liebert XDH fans operating, open the return service valve first, then open the supply service valve. Cool air is discharged from the Liebert XDH.

c. **For an operational Liebert XD system and Liebert XDHs pre-charged:**
   1. Open the return service valve.
   2. Open the supply service valve.
   3. With the Liebert XDH fans operating, cool air is discharged from the Liebert XDH.

Figure 30 Liebert XD system with prefabricated piping assembly and Liebert XD Flex Pipe


Return Service Valve
Make sure valve is open after system leak check
Supply Service Valve
Make sure valve is open after system leak check
Return Main
Supply Main
Return Liebert XD Flex Pipe from Liebert XDH module
Supply Liebert XD Flex Pipe to Liebert XDH module

6.13.6 Disconnect a Liebert XD Flex Pipe from a Liebert XD System

CAUTION

Risk of sudden discharge of pressurized refrigerant. Can cause equipment damage or injury.

Do not disconnect threaded refrigerant couplings at the module end without relieving system pressure. Reclaim any refrigerant during removal of module from system.

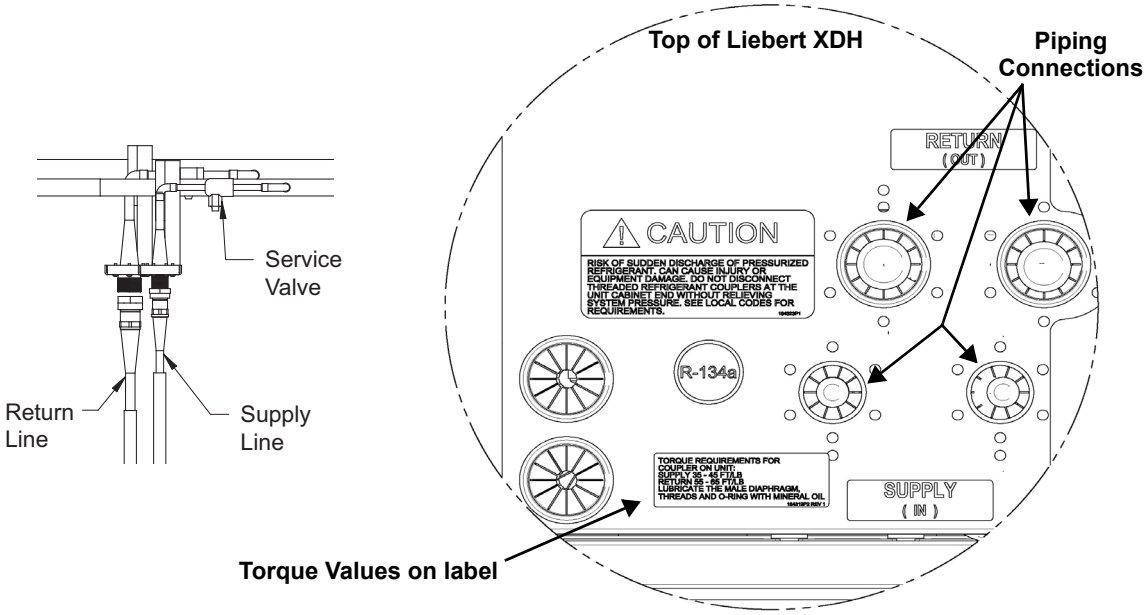
Tools Required

- Two adjustable wrenches with a maximum adjustment size of 2 inches

This operation must be performed on each of the two circuits in the Liebert XDH.

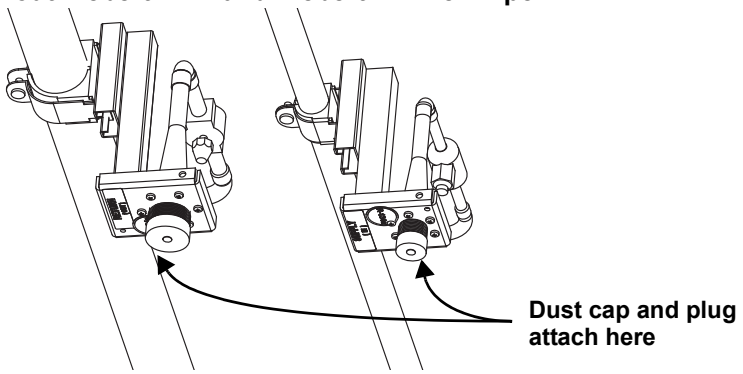
1. Ensure the Liebert XDH fan switches are both On and the fans are operational.
2. Close the service valve in the supply line to the Liebert XDH.
3. With the Liebert XDH fans running, wait two minutes for the refrigerant to flow out of the module.
4. Close the service valve in the return line to the Liebert XDH.
5. Turn the fan power switches to the Off position. Once the fan switches are turned Off, unplug the power cords from their power source. See **7.0 - Electrical Connections** for details.
6. Loosen the Liebert XD Flex Pipe coupling from the header port coupling. This requires an adjustable wrench. Refer to **Figure 28**; see **Figure 31**. The Liebert XD Flex Pipe coupling must be held stationary while the union nut on the coupling is loosened.
7. Disconnect the coupling.

Figure 31 Profile view of the Liebert XD system and Liebert XD Flex Pipe location


Top of Liebert XDH
Piping Connections
RETURN (OUT)
CAUTION
RISK OF SUDDEN DISCHARGE OF PRESSURIZED REFRIGERANT. CAN CAUSE INJURY OR EQUIPMENT DAMAGE. DO NOT DISCONNECT THREADED REFRIGERANT COUPLERS AT THE UNIT CABINET END WITHOUT RELIEVING SYSTEM PRESSURE. SEE LOCAL CODES FOR REQUIREMENTS.
R-134a
TORQUE REQUIREMENTS FOR COUPLER ON UNIT:
SUPPLY 35 - 45 FT/LB
RETURN 95 - 99 FT/LB
LUBRICATE THE MALE DIAPHRAGM THREADS AND O-RING WITH MINERAL OIL
SUPPLY (IN)
Service Valve
Return Line
Supply Line
Torque Values on label

8. Place the protective dust cap on the port.
9. Place the protective plug back on the Liebert XD Flex Pipe.
10. Repeat **Steps 6** through **9** for the remaining Liebert XD Flex Pipe.

Figure 32 Piping mains without Liebert XDH and Liebert XD Flex Pipe



6.13.7 Disconnecting the Liebert XD Flex Pipe from the Liebert XDH

NOTICE

Risk of improper reuse of Liebert XD Flex Pipes with one-shot couplings. Can cause refrigerant leaks.

Liebert XD Flex Pipes with one-shot couplings must not be removed from the Liebert XDH unless they are being replaced with Liebert XD Flex Pipes with one-shot couplings. Do not reuse Liebert XD Flex Pipes with one-shot couplings. Reuse may result in refrigerant leaks.

Tools Required

- Two adjustable wrenches with a maximum adjustment size of 2 inches

1. Reclaim the refrigerant in the Liebert XD Flex Pipe and in the module by attaching a refrigerant reclaim device to the Schrader valve. For help finding the Schrader valve, see **Figures 19** and **23**.
2. Hold the Liebert XD Flex Pipe so it does not rotate.

   For the Liebert XD Flex Pipe with one-shot couplings, additionally, hold the brass body of the coupling so it does not rotate while loosening the couplings. Failing to do so may cause damage.
3. Loosen the Liebert XD Flex Pipe coupling from the module with a wrench.
4. Replace the dust plug on the Liebert XD Flex Pipe.
5. Replace the dust cap on the Liebert XD module.
6. Lay the Liebert XD Flex Pipe with removable couplings aside where it will not be damaged. Discard or recycle the one-shot Liebert XD Flex Pipes.

NOTICE

Risk of kinked Liebert XD Flex Pipes. Can cause permanent damage and leaks in the Liebert XD Flex Pipes.

Do not fold or bend pipe tightly.

7.0 ELECTRICAL CONNECTIONS

The module must be installed in accordance with national wiring regulations. Refer to the module's serial tag for electrical requirements. Refer to **Table 9** for details.

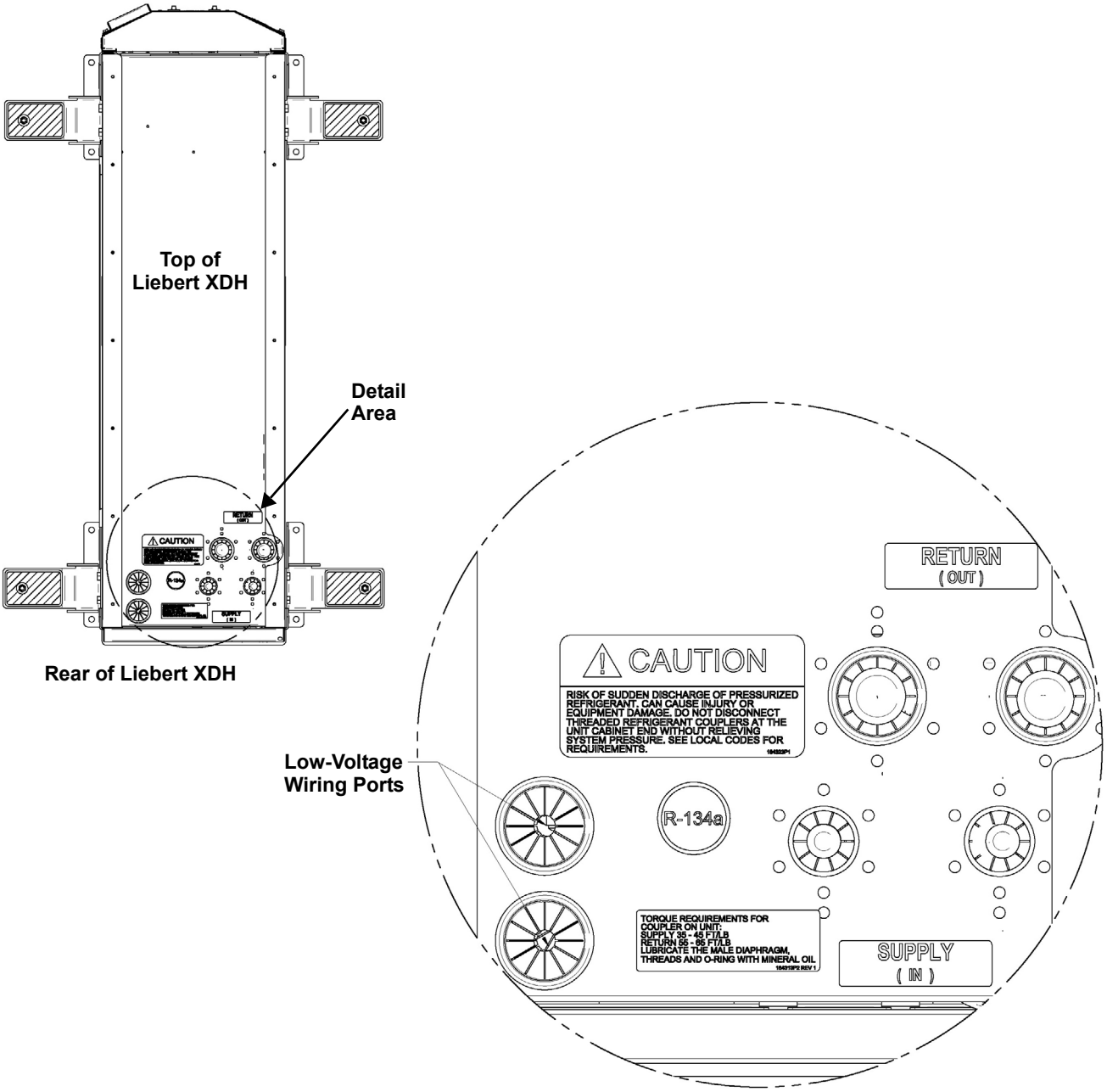
Replacement of any wiring or supply cord must be performed only by the manufacturer, the manufacturer's service agent or a similarly qualified person.

WARNING

Risk of electric shock. Can cause injury or death.

Disconnect both electric power cords before working within the module.

Figure 33 Electrical wiring entry points—high-voltage and low-voltage


Top of
Liebert XDH
Detail
Area
Rear of Liebert XDH
Low-Voltage
Wiring Ports
RETURN
(OUT)
CAUTION
RISK OF SUDDEN DISCHARGE OF PRESSURIZED REFRIGERANT. CAN CAUSE INJURY OR EQUIPMENT DAMAGE. DO NOT DISCONNECT THREADED REFRIGERANT COUPLERS AT THE UNIT CABINET END WITHOUT RELIEVING SYSTEM PRESSURE. SEE LOCAL CODES FOR REQUIREMENTS.
R-134a
TORQUE REQUIREMENTS FOR COUPLER ON UNIT:
SUPPLY 35 - 45 FT/LB
RETURN 25 - 35 FT/LB
LUBRICATE THE MALE DIAPHRAGM, THREADS AND O-RING WITH MINERAL OIL
SUPPLY
(IN)

7.1 Connecting High-Voltage Wiring

The Liebert XDH requires single-phase power for normal operation. The module ships with two power cords, each 10 feet (3m) long with NEMA 5-15 plugs, which connect to common, three-prong outlets (see **Figures 34** and **35**).

The XDH will function properly with only one power cord. The second power cord permits connection to a separate power source to increase reliability—If one power source fails, the cord connected to the remaining, live power source will power both banks of fans. If only one power source is available, then only the power connection labeled "SECONDARY" should be connected to the power source.

To attach the power cords, clip the plastic hangers attaching the cords to the Liebert XDH. Press the appropriate end of each cord onto the electrical inlet. Attach the strain-relievers onto the power cords and press the assemblies into the cable exit slots.

Figure 34 Basic Liebert XDH electrical connections

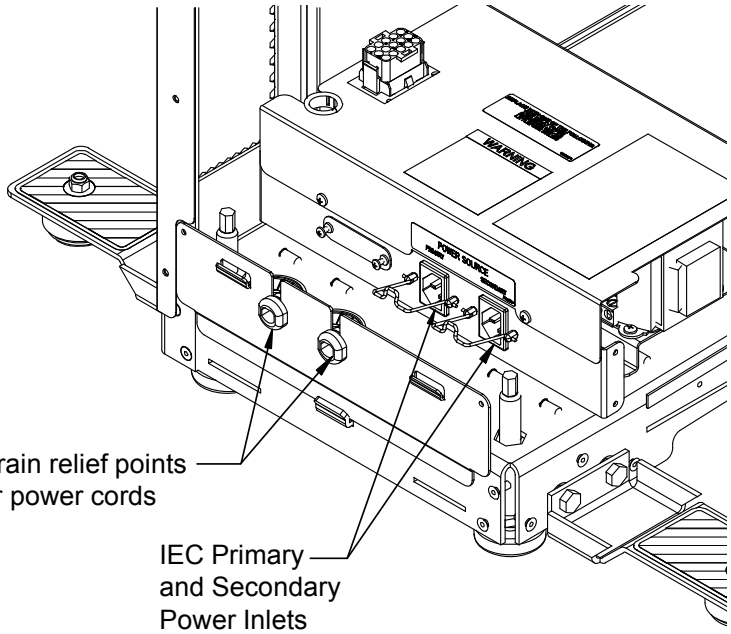
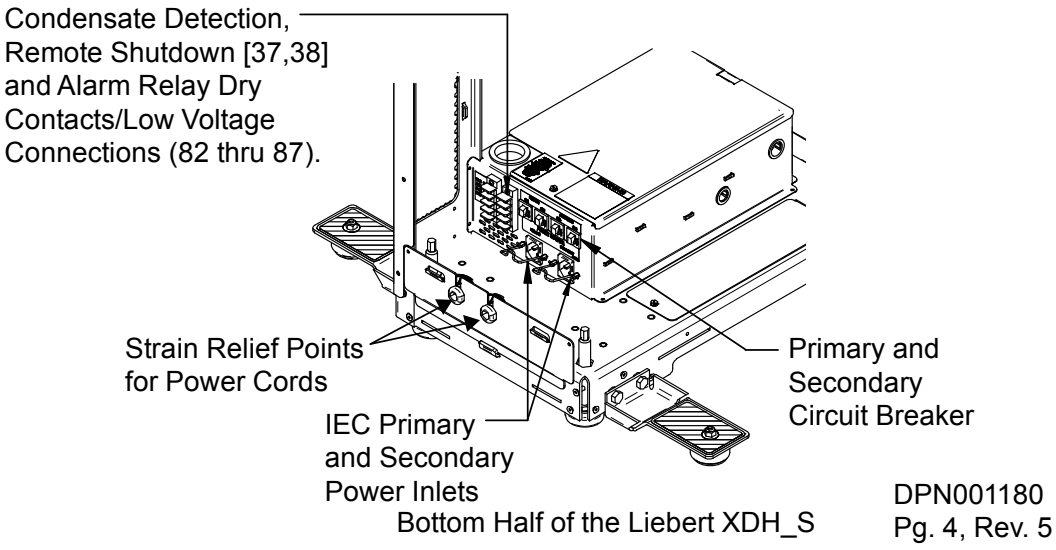

60Hz MODELS ONLY
Field-wiring connections at terminal strip to be NEC Class 2. Use switch contacts with 75VA minimum rating.
50Hz MODELS ONLY
Field-wiring connections at terminal strip for safety extra low voltage circuits only. Use switch contacts rated 75VA minimum, 24VAC maximum.
Strain relief points for power cords
IEC Primary and Secondary Power Inlets
Rear Door and Side Panel not shown for clarity
DPN001180
Pg. 4, Rev. 5

Figure 35 Smart Liebert XDH electrical connections


Condensate Detection, Remote Shutdown [37,38] and Alarm Relay Dry Contacts/Low Voltage Connections (82 thru 87).
Strain Relief Points for Power Cords
IEC Primary and Secondary Power Inlets
Primary and Secondary Circuit Breaker
Bottom Half of the Liebert XDH_S
DPN001180
Pg. 4, Rev. 5

7.2 Connecting Low-Voltage Wiring—Liebert XDH Smart Modules

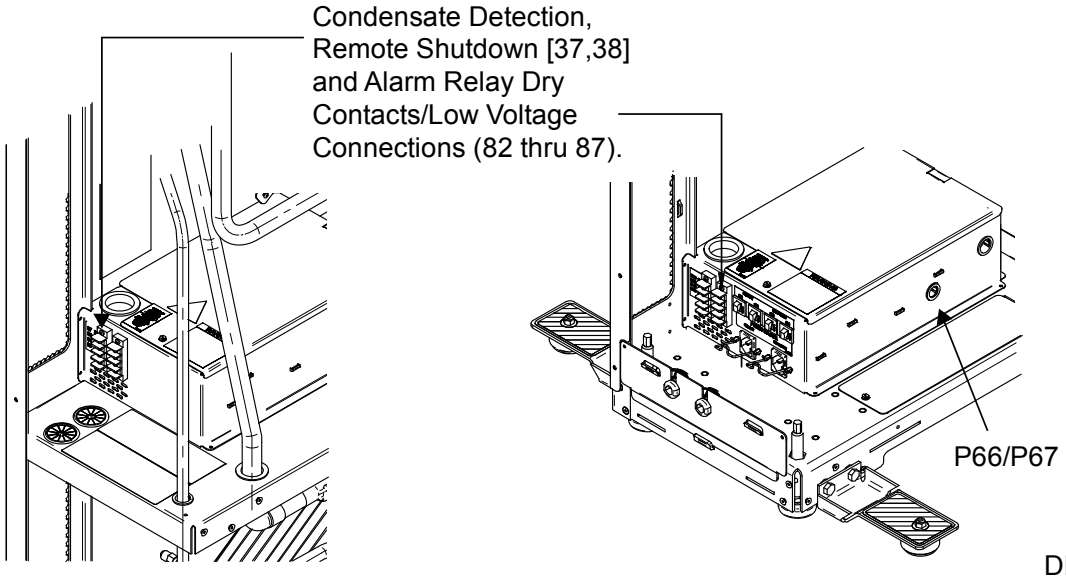
Low-voltage connections are available only on the Liebert XD smart module. The low-voltage connections for Liebert XDH smart modules are in the rear of the modules. There are two connection locations, one for the lower bank of fans and one for the upper bank of fans. The power connections are shown in **Figure 36**; the communication ports are on the rear left side of the Liebert XDH.

These dry contacts can to be connected to a monitoring unit, such as Liebert SiteScan®. Make connections on these modules according to site-specific drawings. The module must be installed in accordance with national and local wiring regulations.

Terminal block connections 37, 38 and 82 through 87 can be connected to a monitoring unit, such as Liebert SiteScan. The remote shutdown, condensate detection alarm, and fan failure alarms operate independently of each other.

- Contacts 37 and 38 are for remote shutdown.
- Contacts terminals 82, 83 and 84 are activated by the condensate detection alarm.
  - T82 is used for normally open contact closure requirements.
  - T83 is common.
  - T84 is used when normally closed contact closure is required.
- Contacts terminals 85, 86 and 87 are activated by the fan failure alarm.
  - T85 is for normally open contact closure requirements.
  - T86 is common.
  - T87 is used when normally closed contact closure is required. The condensate detection alarm and the fan failure alarm operate independently of each other.
- P66 and P67 are CAN bus ports.

Figure 36 Low-voltage connections—Liebert XDH smart module


Condensate Detection, Remote Shutdown [37,38] and Alarm Relay Dry Contacts/Low Voltage Connections (82 thru 87).
P66/P67
Top Half of the XDH_S
Bottom Half of the XDH_S
DPN001180
Page 6, Rev 5

8.0 CANBUS LIEBERT XDP OR LIEBERT XDC INTERCONNECTION WITH SMART MODULES

A Controller Area Network (CAN) is a specialized internal communication network. It allows a Liebert XDP, Liebert XDC and Liebert XD smart modules to communicate without a host computer. Networking the Liebert XDP or Liebert XDC to smart modules enables the smart modules to be controlled and monitored from the Liebert XDP or Liebert XDC.

Figure 37 shows a typical Liebert XD system in a CANbus network. Liebert XD smart modules should be connected to the Liebert XDP or Liebert XDC that supplies the modules with refrigerant.

Figure 37 Liebert XD system with CANbus

NOTE

Only six Liebert XDH20S are shown in **Figure 37**. A CANbus network can accommodate a maximum of eight single-circuited Liebert XDH20S* and five single-circuited Liebert XDH32S*. A CANbus network can accommodate a maximum of dual-circuited 16 XDH20S* and 10 dual-circuited Liebert XDH32S*.*

Plan wiring runs for Unit-to-Module communication when designing the layout of the conditioned space. In addition to general good wiring practices for CANbus cables:

- Keep control and communication cables away from power cables to prevent electromagnetic interference.
- Do not bend cables to less than four times the diameter of the cable.
- Do not deform cables when securing them in bundles or when hanging them.
- Keep cables away from devices that can introduce noise into them, (e.g., machines, fluorescent lights and electronics).
- Avoid stretching cables; tension when pulling cables should not exceed 25 pounds (11kg).
- Do not secure cables with any method that might damage them; use approved hangers, such as telephone wire/RG-6 coaxial wire hangers, available at most hardware stores.
- Do not run cables through conduit. Cables should be treated as any other data cable. Running CANbus cables through conduit will increase the total length required.

8.1 Network Layout Options

The Liebert XDP and Liebert XDC have two CANbus ports (P2 and P4) each on the CAN isolator in the low voltage side of the electrical box (see **Figure 42**). This allows creating two network chains to minimize the total network length.

8.1.1 Remote Sensor Temperature/Humidity Sensor Placement and Connection to the CANbus

The Liebert XDP and Liebert XDC are shipped with two remote temperature/humidity sensors. One sensor should be placed closer to the Liebert XDP or Liebert XDC; the other should be placed in the warmest part of the cold aisle or in the return air stream of a computer room air conditioning unit, such as the Liebert DS™ or Liebert CW™.

The remote sensors can be placed at the end of a chain or in the middle of a daisy chain as shown. Refer to **Figures 38** and **39** for acceptable network layouts.

Figure 38 Modules on a single chain

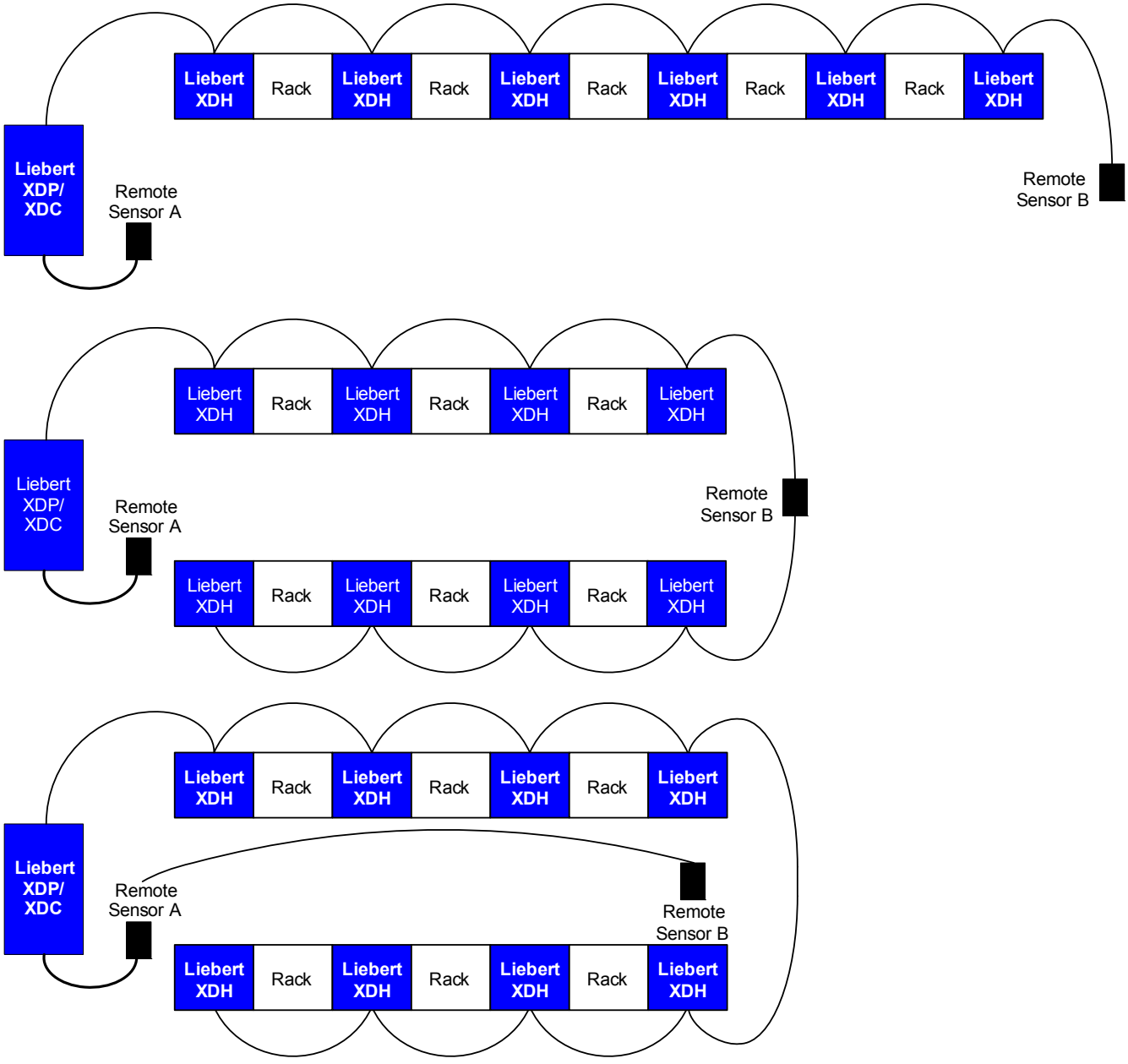
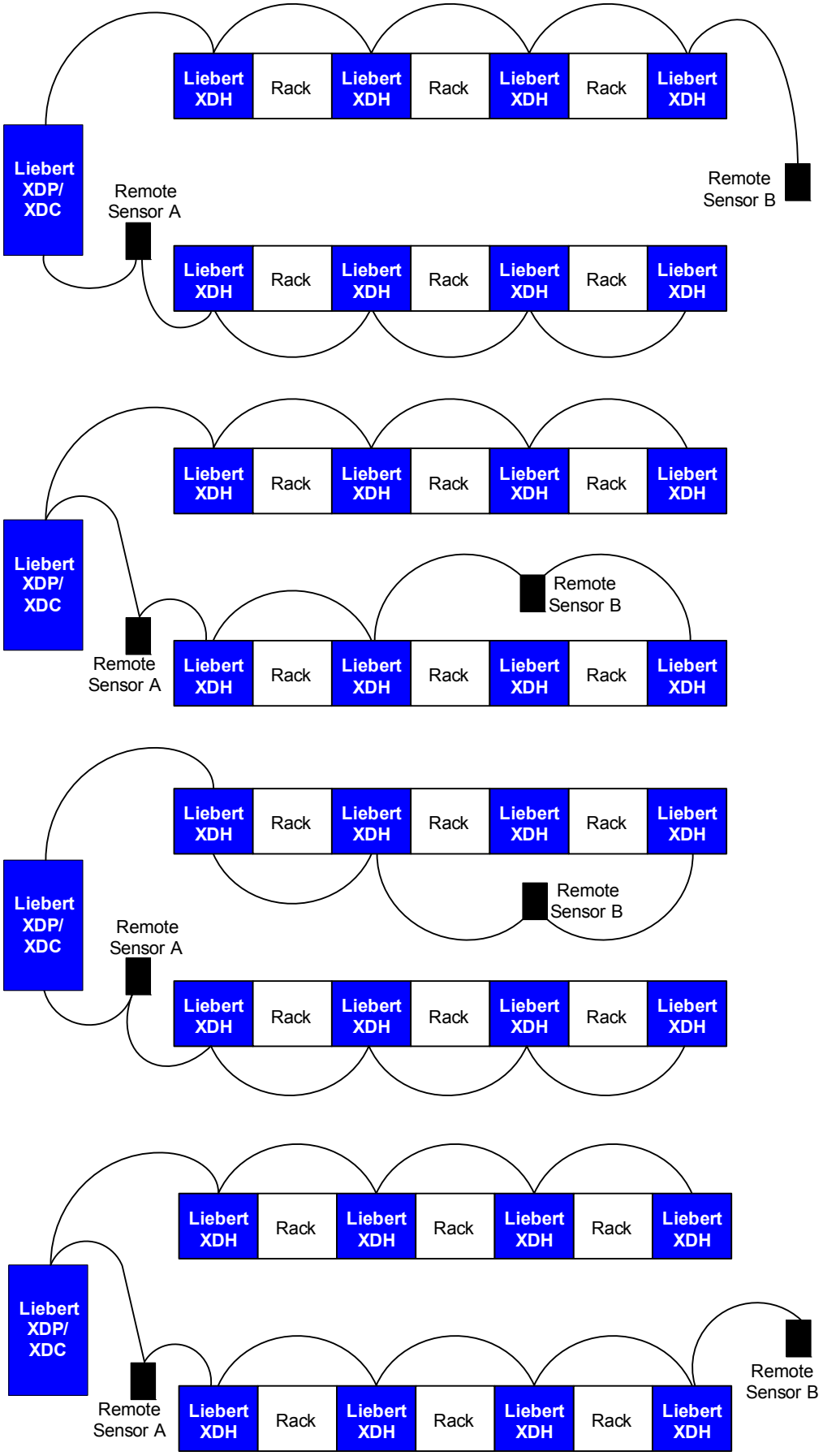


Figure 39 Modules on two chains



8.1.2 CANbus maximum length

The CANbus network (the sum of the two CANbus chains) has a maximum length limitation. If the Liebert XDP or Liebert XDC with Liebert iCOM does not have a CAN isolator, the maximum total network length is 150ft. (45m) without measuring the final device voltage. The total network length must include the remote temperature and humidity sensor cable lengths. If the Liebert XDP or Liebert XDC contains a CAN isolator, the maximum network length is 300ft. (91m). To exceed this length, the final device voltage must be measured.

Measuring Final Device Voltage

Required tools

- RJ11 6-way modular adapter; shown Paladin Tools RJ11 6-way Modular Adapter (Paladin part number 1903) or similar tool
- Voltmeter

Testing the voltage requires the Liebert XDP or Liebert XDC and all connected smart modules to be turned On.

1. Start the Liebert XDP or Liebert XDC. Refer to SL-16644 or SL-16674.
2. Locate P67 on the final device.
3. Plug the RJ11 Adapter into P67.
4. Measure the DC voltage between Pins 1 (-) and 2 (+). The voltage should be between 8 and 17.5VDC.
5. Measure the DC voltage between Pins 5 (+) and 6 (-). The voltage should be between 8 and 17.5VDC.
6. Remove the RJ11 adapter.
7. Repeat for second chain if the smart modules are separated into two chains within the network.

8.2 CANbus Cables

The Liebert XDP may be connected to the smart modules with a CANbus cable. The shielded cable consists of three pairs of twisted wires with a 6-pin RJ12 connector.

NOTICE

Risk of improper cable construction. Can cause equipment damage.

Mismatching wire pins at the RJ12 connection will damage the CAN device. Extreme caution should be taken when making cables.

Figure 40 CANbus cable

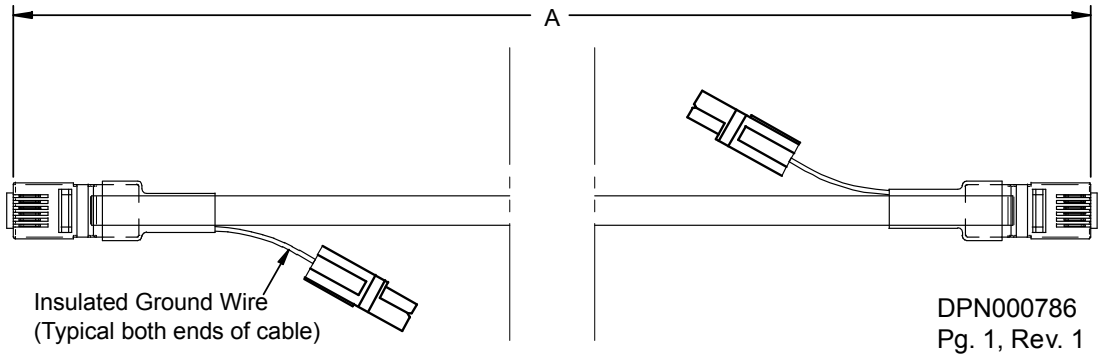
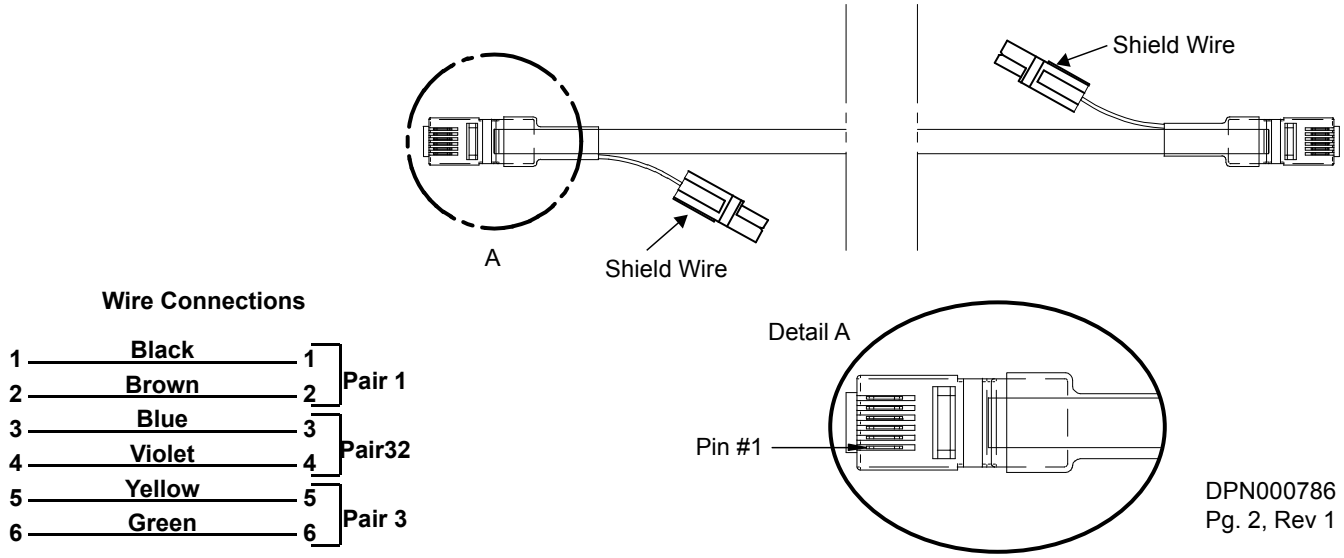


Table 7 CANbus cable lengths and part numbers

Liebert Part #	Dimension A ft. (m)
300157G1	6 (1.8)
300157G2	10 (3)
300157G3	20 (6)
300157G4	30 (9.1)
300157G5	60 (18.3)
300157G6	90 (27.4)
300157G7	120 (36.6)
300157G8	150 (45.7)
300157G9	6.25 (1.9)
300157G10	3 (0.9)
300157G11	15 (4.6)
300157G13	40 (12.2)
300157G14	50 (15.2)
300157G15	70 (21.3)
300157G16	80 (24.4)
300157G17	100 (30.5)
300157G18	110 (33.5)

Figure 41 CANbus cable plug



8.3 Connecting CANbus Network

8.3.1 Connection to the Liebert XDP or Liebert XDC

The Liebert XDP and Liebert XDC have two CANbus ports (P2 and P4) each located on the CAN isolator in the low voltage side of the electrical box (see **Figure 42**). This allows creating two network chains to minimize the total network length.

Figure 42 CAN isolator location in the Liebert XDP/XDC

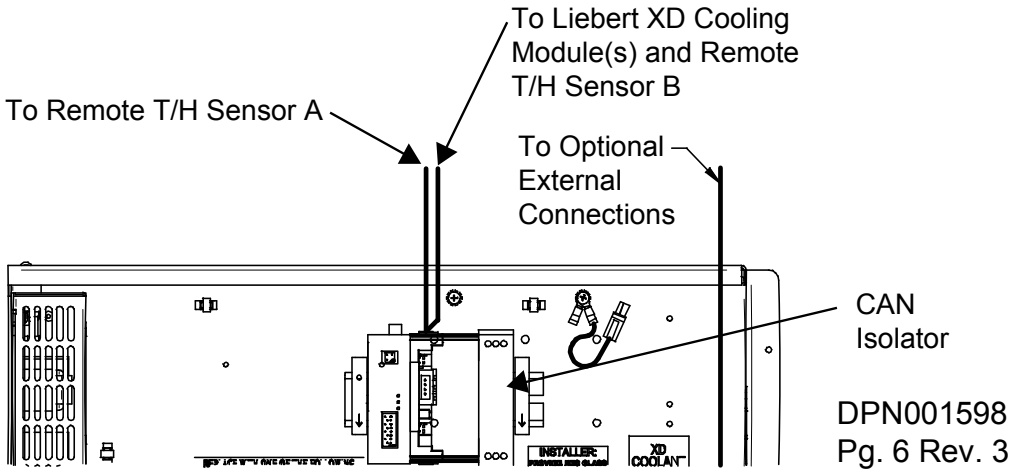
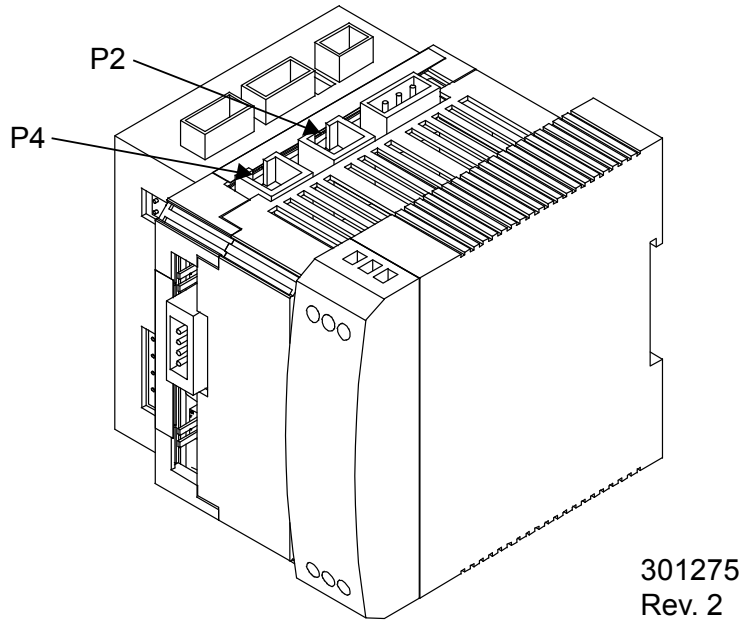

To Liebert XD Cooling Module(s) and Remote T/H Sensor B
To Remote T/H Sensor A
To Optional External Connections
CAN Isolator
DPN001598
Pg. 6 Rev. 3

Figure 43 P2 and P4 locations on the CAN isolator

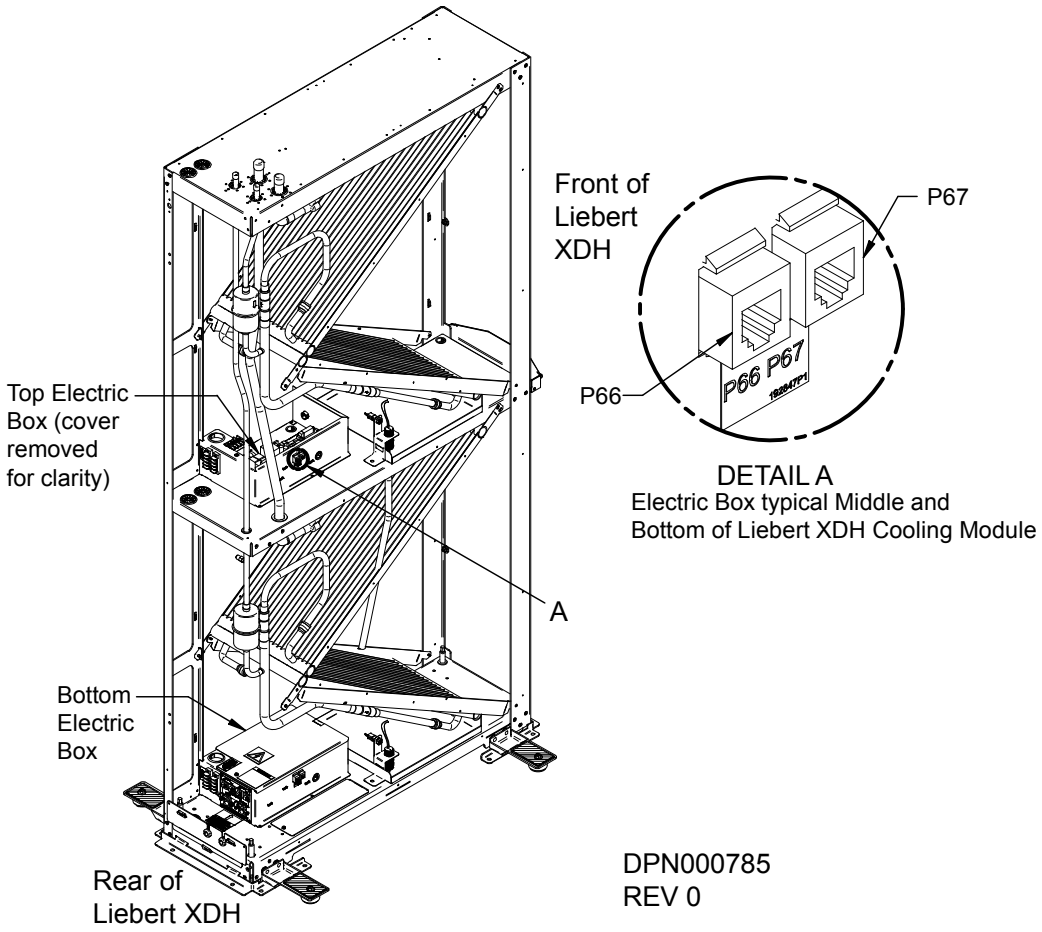


8.3.2 Connecting to the Liebert XD Smart modules

Liebert XDH CANbus Port Locations

The Liebert XDH CANbus ports are located on the side of the electrical box. Refer to **7.0 - Electrical Connections** for accessing the electrical box. The cable from the Liebert XDP or Liebert XDC side will be connected to Port P66. The leaving cable will be connected to Port P67. See **Figure 44**.

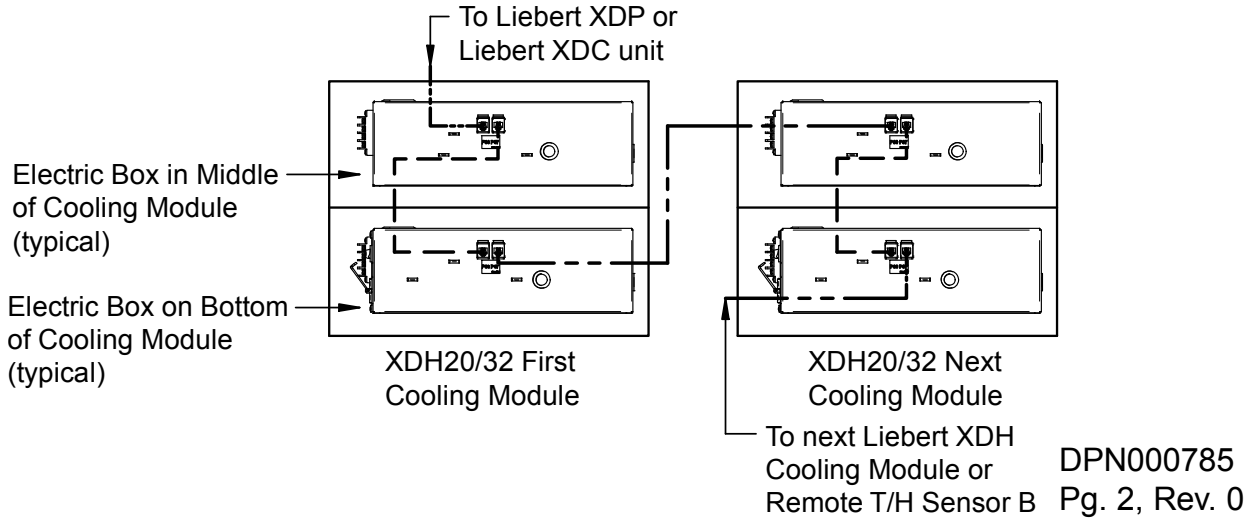
Figure 44 Liebert XDH CANbus port locations



Liebert XDH Single-Circuited CANbus Connections

For Liebert XDHs with both top and bottom circuits tied to the same Liebert XDP or Liebert XDC, the top and bottom control boards must be tied together using a CANbus cable with a length of 6.25ft. (1.9m). See **Figure 45**.

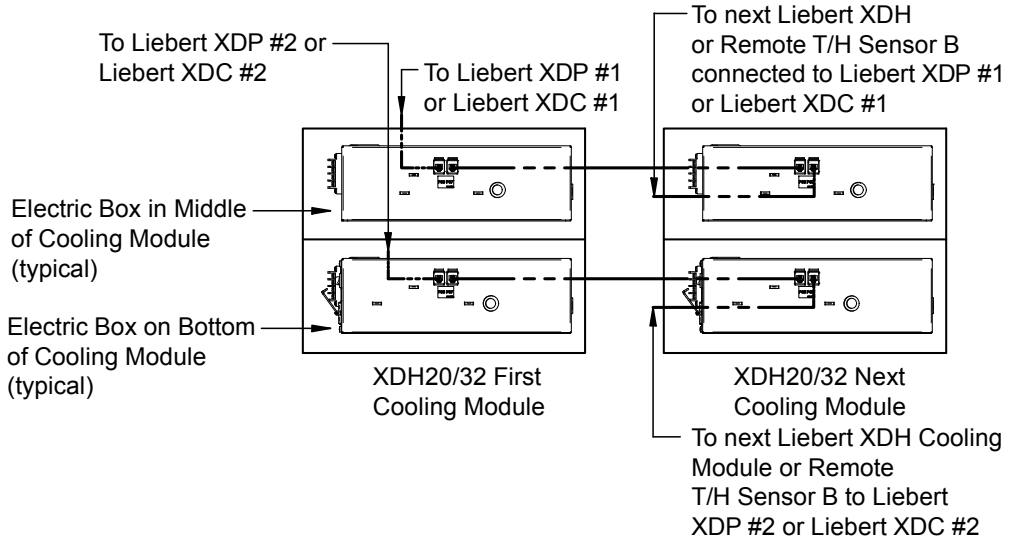
Figure 45 Single-circuited Liebert XDHs


To Liebert XDP or Liebert XDC unit
Electric Box in Middle of Cooling Module (typical)
Electric Box on Bottom of Cooling Module (typical)
XDH20/32 First Cooling Module
XDH20/32 Next Cooling Module
To next Liebert XDH Cooling Module or Remote T/H Sensor B
DPN000785
Pg. 2, Rev. 0

Liebert XDH Dual-Circuited CANbus Connections

The Liebert XD smart modules are to be tied only to the Liebert XDP or Liebert XDC that they are mechanically connected to. For Liebert XDHs with the top and bottom circuits tied to different Liebert XDPs or Liebert XDCs, the control boards must be connected in the same manner. See **Figure 46**.

Figure 46 Dual-circuited Liebert XDHs



DPN000785
Pg. 2, Rev. 0

8.4 CANbus Termination

The last device in the chain must be terminated.

- The remote temperature and humidity sensors are terminated at the factory.
- The Liebert XD smart modules are **not** terminated at the factory.

Improper termination will cause communication errors.

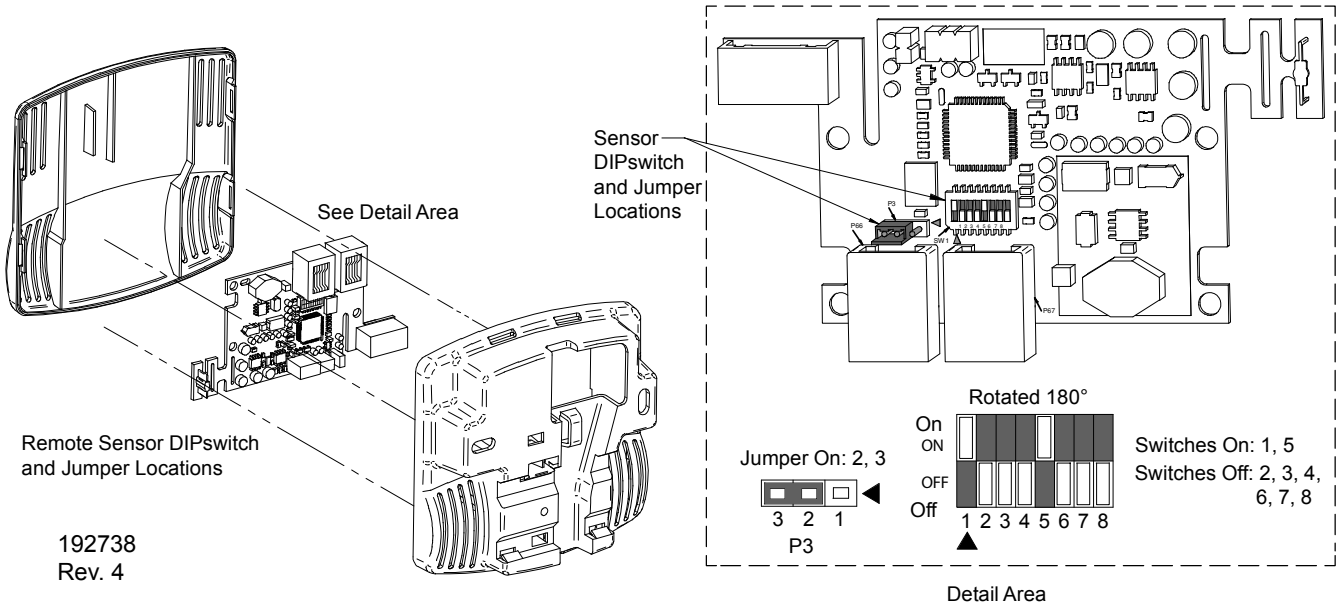
8.4.1 Remote Temperature and Humidity Sensors Termination

The control board is terminated at the factory. If a remote sensor is the last device in the CANbus chain, no changes are necessary. The termination jumper must be removed if a remote sensor is not the last device in the CANbus chain.

To remove the termination jumper:

1. Remove the sensor cover.
2. Place a jumper on Pins 1 and 2 on P3 (see **Figure 47**).
3. Replace the sensor cover.

Figure 47 Removing the remote sensor cover



To terminate a temperature and humidity sensor:

1. Remove the sensor cover.
2. Place a jumper on pins 2 and 3 on P3 (see **Figure 47**).
3. Replace the sensor cover.

8.4.2 Terminating a Smart Module

Liebert XD smart modules must be properly terminated or communication errors will result. Smart modules are shipped from the factory unterminated. If the smart module is the last device in the chain—in other words, the last module is not connected to a remote sensor—the smart module control board must be terminated. Refer to **11.2 - Internal Access** for instructions to access the module control board.

To terminate a smart module:

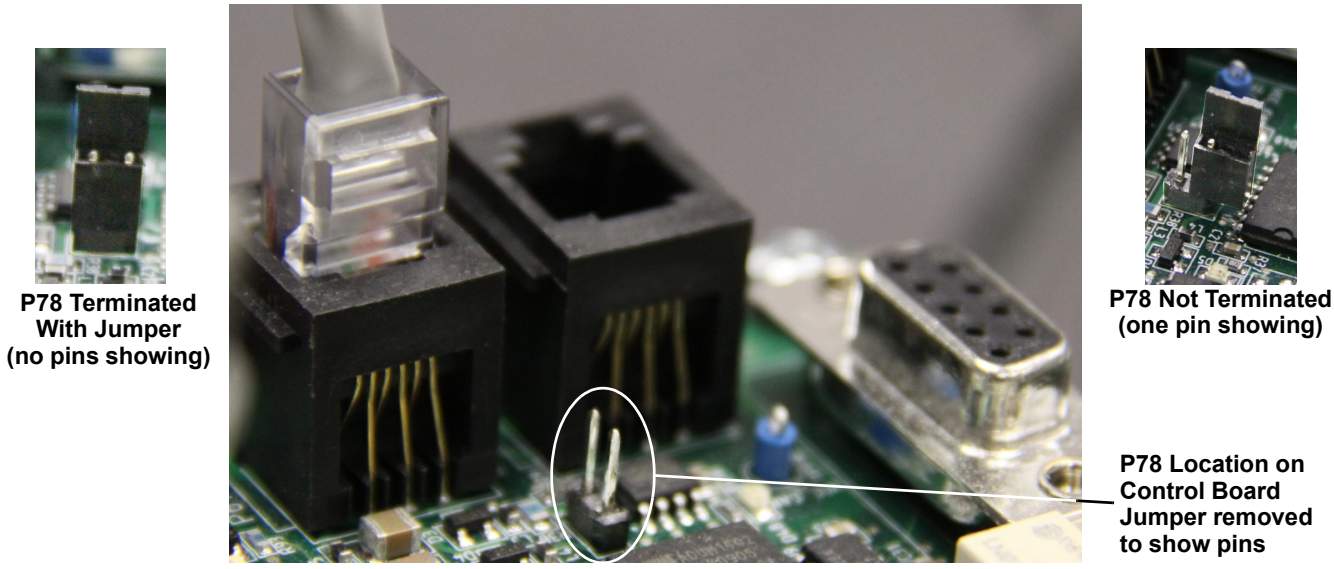
1. Locate the smart module control board.
2. Locate P78 on the control board (see **Figure 48**).
3. Place a jumper on P78 (see **Figure 48**).

To **unterminate** a smart module:

Refer to the appropriate Liebert XD smart module for instructions to access the control board.

1. Locate the smart module control board.
2. Locate P78 on the control board (see **Figure 48**).
3. Remove the jumper from P78 (see **Figure 48**).

Figure 48 Liebert XD smart module R38 location



8.4.3 Testing Network Termination

Required Tools

- RJ11 6-way Modular Adapter (use Paladin Tools RJ11 6-way modular adapter, Paladin part number 1903, or similar tool)
- Ohmmeter

Checking the Chain Termination

This procedure applies to the last device connected to each end of the chains, either a Liebert XD smart module or a remote temperature and humidity sensor.

This procedure requires the Liebert XDP or Liebert XDC and the connected modules to be Off.

1. Turn Off the Liebert XDP or Liebert XDC. If needed, refer to SL-16644 for the Liebert XDP or SL-16674 for the Liebert XDC to turn Off the system.
2. Locate P66 on the last control board of the first chain.
3. With the system NOT powered, remove the cable from P66.
4. Connect the cable from P66 to the RJ11 adapter tool.
5. Measure resistance across Pin 3 and Pin 4.
   a. If the resistance is between 100 and 200 ohms, the chain is properly terminated.
   b. If the resistance is less than 100 ohms, the chain is not properly terminated: More than one control board is terminated. Each control board must be checked.
6. Remove the cable from the RJ11 adapter tool.
7. Connect the adapter into P66 using the cable provided with the RJ11 adapter tool.
8. Measure the resistance on the final control board.
   a. If the resistance is between 110 and 140 ohms, the control board is properly terminated.
   b. If the resistance is greater than 200, the control board is not terminated. See **8.4.1 - Remote Temperature and Humidity Sensors Termination** to terminate a remote temperature and humidity sensor and **8.4.2 - Terminating a Smart Module** to terminate a Liebert XD smart module.
9. Reconnect the CANbus cable to P66.
10. Repeat for the second chain.

Checking Individual Control Board Termination

This procedure applies to the devices that are not at the end of the chains, typically a Liebert XD Smart Module.

1. Find P66 and P67 on the control board.
2. Remove the cables from P66 and P67.
3. Plug the RJ11 adapter tool into P67.
4. Measure the resistance between Pin 3 and Pin 4.
   a. If the resistance is between 110 and 140 ohms and it is not the last control board, the device is not properly terminated. See **8.4.1 - Remote Temperature and Humidity Sensors Termination** for unterminating a remote temperature and humidity sensor or **8.4.2 - Terminating a Smart Module** for unterminating a smart module.
   b. If the resistance is greater than 200 ohms and it is not the last control board, the device is unterminated.
5. Remove the RJ11 adapter tool.
6. Reconnect the CANbus cables into P66 and P67.
7. Repeat for all devices until the final connected device is reached.
8. Repeat for the second chain.

9.0 INSTALLATION CHECKLIST AND SYSTEM FILL FOR STARTUP

9.1 Checklist for Proper Installation

___ 1. The Liebert XDH module is properly mounted using tie-down brackets (see **5.1.1 - Install a Tie-Down Bracket—Optional**).

___ 2. Power cords connected to electrical supply.

___ 3. CANbus cables connected to smart modules, T/H sensor and Liebert XDP/Liebert XDC.

___ 4. Piping from the Liebert XDP/Liebert XDC to the Liebert XD modules, with isolation valves piped to each Liebert XD module.

a. Hard-piped modules connected to overhead piping.

b. Liebert XD Flex Pipes connected to header assembly

___ 5. Leak check.

___ 6. Start the Liebert XD module to ensure proper operation (see **10.1 - Start the Liebert XDH Basic Module** or **10.2 - Start the Liebert XDH Smart Module**).

___ 7. Shut down the Liebert XD module.

___ 8. Piping insulated.

9.2 Charging with Refrigerant and Starting the Liebert XD System

The Liebert XD System must be completely installed before it is charged with refrigerant. After installation is complete, refer to the Liebert XDP or Liebert XDC user manual for instructions on charging the Liebert XD modules with refrigerant and starting the system. The complete Liebert XD system includes all Liebert XD cooling modules, a Liebert XDC **or** Liebert XDP unit and any other connected equipment.

10.0 OPERATION

The Liebert XDH's controls are on the front of the module at the Liebert XDH's midline for easy access. Each switch controls the operation of one bank of three fans (see **Figure 49** for basic module, **Figure 50** for smart module). The separate switches permit the use of only one bank of fans at a time, reducing the airflow if the Liebert XDH's full cooling capacity is not needed.

NOTICE

Risk of improper operation. Can cause equipment damage.

At least one of the Liebert XDH's banks of fans must be turned on before either the Liebert XDP or Liebert XDC is switched On.

At least one of the Liebert XDH's banks of fans must be operating at all times that the Liebert XDP or Liebert XDC is operating. Operating either the Liebert XDP or the Liebert XDC without at least one of the Liebert XDH's banks of fans rotating may cause a system malfunction.

10.1 Start the Liebert XDH Basic Module

At least one bank of the Liebert XDH's fans must be On before starting the Liebert XDP or Liebert XDC that will supply refrigerant to the Liebert XDH modules.

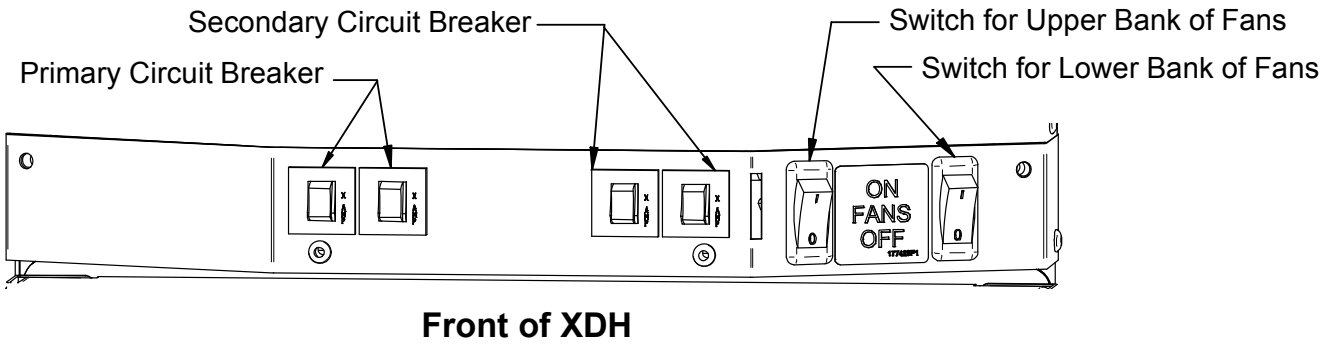
To start the Liebert XDH:

1. Press either of the rocker switches to turn On one or both of the Liebert XDH's banks of fans (see **Figure 49**).

   Pressing the left switch starts the fans in the upper half of the Liebert XDH; the right switch, the lower fans.
2. Wait for the fans to start and then start the refrigerant supply unit, either the Liebert XDP or Liebert XDC. For that procedure, refer to the unit's user manual, available at Liebert's Web site:

   www.liebert.com

Figure 49 Fan switches, Liebert XDH basic modules



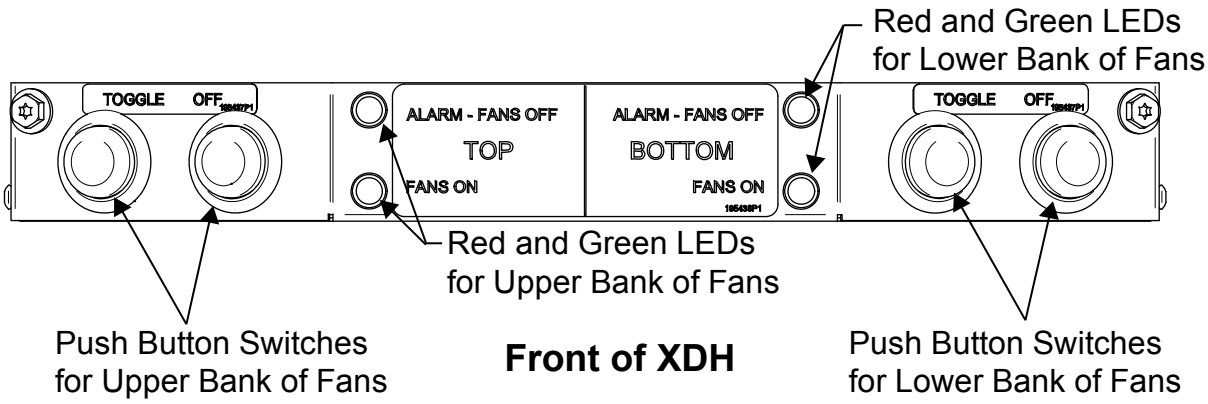
10.2 Start the Liebert XDH Smart Module

When the Liebert XDP/XDC with Liebert iCOM is turned On, the Liebert XDH's fans will turn On automatically.

To start the Liebert XDH:

1. Turn On one or both of the Liebert XDH's banks of fans by pressing either of the push button switches on the front of the module (see **Figure 50**).
   a. Pressing the left push button (toggle) switch starts the top and bottom fans in the upper half of the Liebert XDH; the right toggle switch starts the top and bottom fans in the lower bank.
   b. Pressing either toggle switch a second time initiates an algorithm that turns the middle fans in the fan banks On and Off as needed for cooling.
2. Pressing each toggle switch a third time turns the middle fans on continuously.
3. Wait for the fans to start and then start the refrigerant supply unit, either the Liebert XDP or Liebert XDC. For that procedure, refer to the unit's user manual, available at Liebert's Web site:
   www.liebert.com

Figure 50 Fan switches, Liebert XDH smart modules



10.3 LED Indicators on Liebert XDH Smart Modules

Liebert XDH smart modules have two LEDs on the front, one red and one green (see **Table 8**).

- Red LED indicates alarms
- Green LED indicates the fans' status

Table 8 Key to LED indicators

Red LED	Green LED	Condition
BLINKING: On - short (< 1/2 second), Off - long (nearly 2 seconds)	OFF	The module has power, but fans are Off. User can turn fans On.
OFF	BLINKING: On 1 second, Off 1 second	No alarms. Fan #1 has not been started. Fan #2 is On continuously.
OFF	BLINKING: On - long (1-1/2 seconds), Off - short (1/2 second)	No alarms. Fan #1 is cycling. Fan #2 is On continuously.
OFF	ON continuously	No alarms. Both fans are On continuously.
ON continuously	BLINKING: On - long (1-1/2 seconds), Off - short (1/2 second)	Alarm condition (condensate detected or fan failure). Fan #1 is cycling. Fan #2 is On continuously.
ON continuously	ON continuously	Alarm condition (condensate detected or fan failure). Both fans are On continuously.
BLINKING: On - long (nearly 2 seconds), Off - short (< 1/2 second)	OFF	Remote shutdown activated.

10.3.1 Activating Remote Shutdown Option

The optional remote shutdown option can be made operational by removing the jumper on Terminal Blocks 37 and 38. If the jumper is not removed, the module will stay active.

If the remote shutdown jumper is present, then remote shutdown is not operational.

11.0 MAINTENANCE

Minimal maintenance is required to keep the Liebert XDH operating at optimal levels. The module should be cleaned and checked for damage and worn parts. Suggested maintenance includes:

- Cooling fins—Clean any dust and debris from the cooling fins, taking care not to bend them
- Circulating fans—Clean any dust from the fans.

11.1 Fluorinated Greenhouse Gas Requirements

Stationary air conditioning, refrigeration, heat pump equipment and stationary fire protection systems in the European Community market and operating with fluorinated greenhouse gases (f-gas), such as R407C, R134a, R410A, must comply with the F-Gas Regulation: (EC) No. 842/2006 (F-gas). The regulation prohibits, among other actions, venting fluorinated greenhouse gases to the atmosphere.

The F-Gas Regulation requires operators to use all measures that are technically feasible and do not entail disproportionate cost to prevent leakage of these gases, to test for leakage regularly and to recover f-gas during equipment service and maintenance and before disposing of equipment.

Refer to the full regulation for additional details.

11.2 Internal Access

WARNING

Risk of electric shock. Can cause injury or death.

System contains hazardous electrical voltage. Disconnect both power cords from the electrical supply outlets or from the receptacles on the back of the Liebert XDH before working within.

- Turn off the two fan switches on the front of the Liebert XDH (see **Figure 49**).

The conditions required for sensitive electronic equipment should preclude the accumulation of appreciable amounts of dust in the Liebert XDH. Most of that small amount should be found on the coils, which are accessible by opening the rear door of the module. The fans, on the front may be cleaned by removing the front grilles, which are secured with snap-on connections.

The rear door and the fan tray on the front of the Liebert XDH are easily removed for maintenance. (A wiring diagram is provided on the center shelf.)

11.3 Remove the Fan Tray

WARNING

Risk of electric shock. Can cause injury or death.

System contains hazardous electrical voltage. Disconnect both power cords from the electrical supply outlets or from the receptacles on the back of the Liebert XDH before working within.

- Turn off the two fan switches on the front of the Liebert XDH (see **Figure 49**).

WARNING

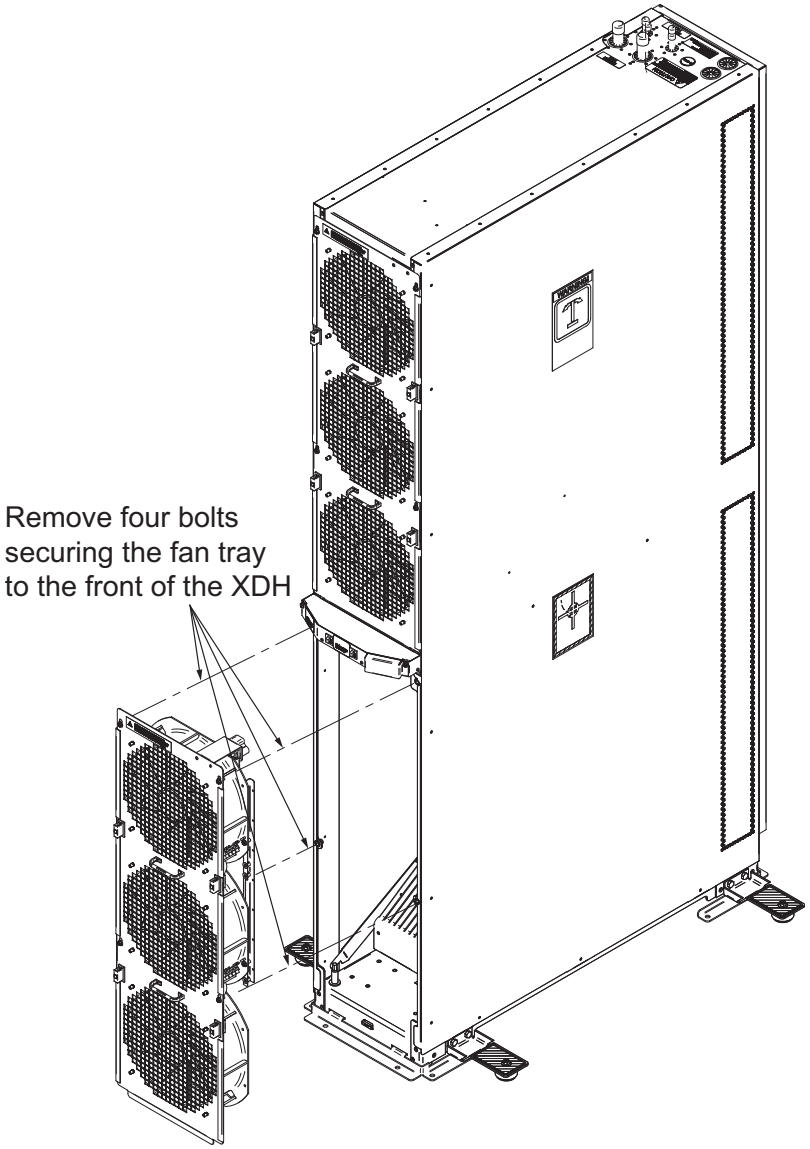
Risk of contact with high-speed moving parts. Can cause injury or death.

Disconnect all local and remote electric power supplies and verify that all fan blades have stopped rotating before working in the unit.

1. Ensure that all electrical power to the Liebert XDH has been shut off before beginning to remove the fan tray.
2. Remove four bolts on the Liebert XDH fan tray (see **Figure 51**).
3. Lift the tray out of the module to install the new tray.

Reverse the steps above to install a new fan tray. Be certain to align the connectors, including the electricity connector, when installing the new fan tray.

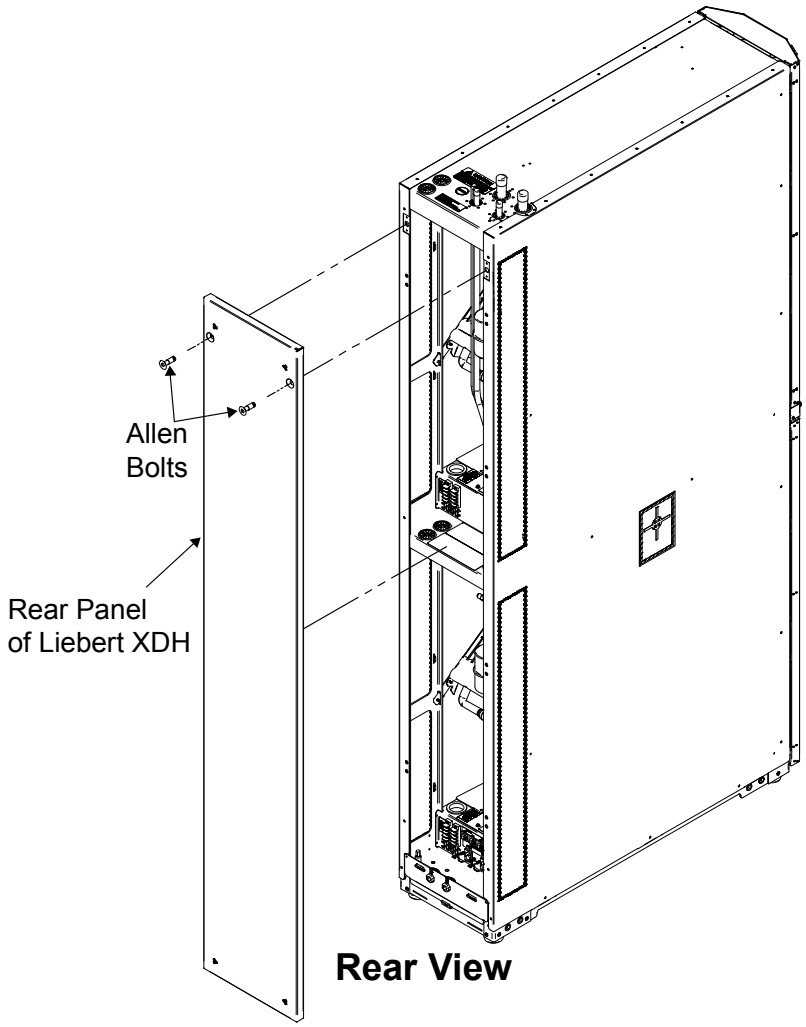
Figure 51 Removing the fan tray



11.4 Accessing Internal Components in the Rear of the Liebert XDH

The Liebert XDH rear panel can be removed to gain access to internal components, such as the electronic boards and related items. The panel of the basic or smart Liebert XDH is removed the same way, by removing the bolts on the rear panel (see **Figure 52**).

Figure 52 Remove Liebert XDH rear panel



11.5 Open Electric Box—Liebert XDH Basic Modules

WARNING

Risk of electric shock. Can cause injury or death.

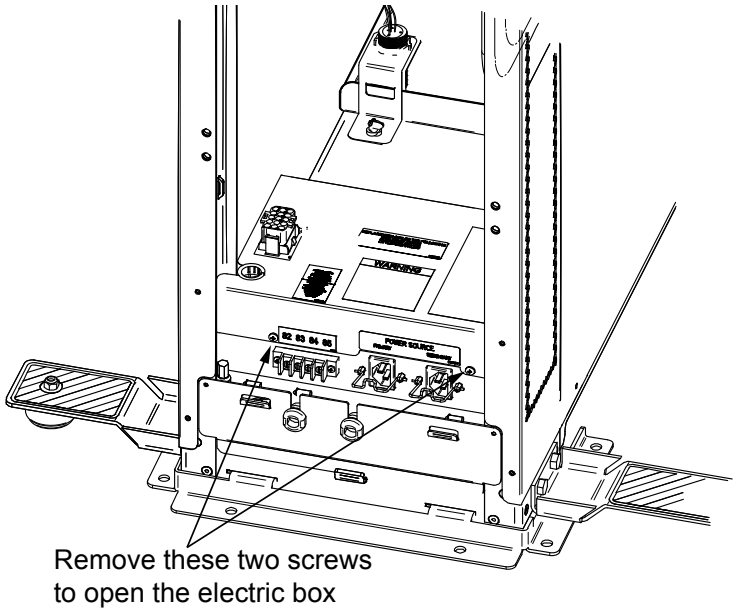
System contains hazardous electrical voltage. Disconnect both power cords from the electrical supply outlets or from the receptacles on the back of the Liebert XDH before working within.

The electric box in the lower portion of the Liebert XDH can be opened for maintenance, such as replacing a circuit breaker and checking wiring connections. To open the box:

1. Disconnect both power cords from the electrical supply outlets or from the receptacles on the back of the Liebert XDH.
2. Remove the back from the Liebert XDH and lay it aside where it will not be damaged (see **Figure 52**.
3. Unplug the power cords from the primary and secondary input connections on the electric box.
4. Remove the two screws on the front of the electric box (see **Figure 53**).
5. Lift off the front of the electric box.

After performing the maintenance, reverse the removal steps to reinstall the electric box's front cover.

Figure 53 Open electric box on Liebert XDH basic module



11.6 Open Electric Box—Liebert XDH Smart Modules

WARNING

Risk of electric shock. Can cause injury or death.

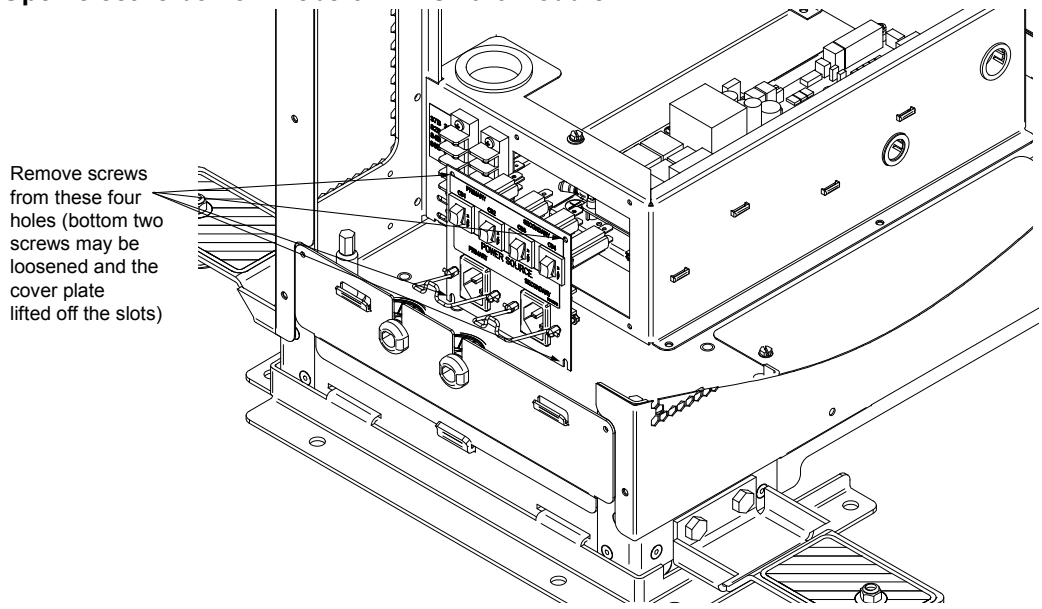
System contains hazardous electrical voltage. Disconnect both power cords from the electrical supply outlets or from the receptacles on the back of the Liebert XDH before working within.

The electric box in the lower portion of the Liebert XDH can be opened for maintenance, such as replacing a circuit breaker and checking wiring connections. To open the box:

1. Disconnect both power cords from the electrical supply outlets or from the receptacles on the back of the Liebert XDH.
2. Remove the back from the Liebert XDH and lay it aside where it will not be damaged (see **Figure 52**.
3. Unplug the power cords from the primary and secondary input connections on the electric box.
4. Remove the four screws on the front of the electric box the lower two screws may be loosened and left in the box (see **Figure 53**).
5. Lift off the front of the electric box.

After performing the maintenance, reverse the removal steps to reinstall the electric box's front cover.

Figure 54 Open electric box on Liebert XDH smart module



12.0 SPECIFICATIONS

Table 9 Liebert XDH32 specifications

Models*	XDH32BK XDH32SK (60Hz)	XDH32BS XDH32SS (50/60Hz)
Cooling Capacity	**XDH32**, 60Hz Nominal (98ºF [37°C] EAT): 30kW/8.5 Tons **XDH32**, 60Hz Maximum(105ºF [41°C] EAT): 34kW/9.7 Tons **XDH32**, 50Hz Nominal (98ºF [37°C] EAT): 30kW/8.5 Tons **XDH32**, 50Hz Maximum(103ºF [39°C] EAT): 34kW/9.7 Tons	
Conditions	Capacity rating is @ 55ºF (13ºC) Entering Fluid Temperature and 50ºF (10ºC) or lower dew point	
Electrical Requirements		
Input	120V-1ph-60Hz	220-240V-1ph-50Hz, CE / 208-240V-1ph-60Hz, CSA
Input power connections	Two IEC320-C14 power inlets and two IEC power cords with NEMA 5-15P plugs	Two IEC320-C14 power inlets and two IEC power cords with IEC320-C14 plugs
Full Load Amps	10	5
Power consumption, nominal, Watts	1200	1150
Dimensions, inches (mm)		
Height—module only	78 (1981)	
Height—including hard-piped connections	80 (2032)	
Width	12 (305)	
Depth	42 (1067)	
Weight, lb (kg)		
Module only	246 (112)	246 (112)
Shipping weight	330 (150)	330 (150)
Number of Fans	6	
Airflow, Nominal, ft^3/min (m^3/hr)	4000 (6796)	3850 (6541)
Audible Noise, Sound Power	86 dBa	86 dBa
Pipe Connections		
Refrigerant supply	1/2" OD, Cu	
Refrigerant return	7/8" OD, Cu	
Serviceable Parts	Fans and electrical components	
Cabinet Exterior Finish	Black, matte finish, heat-fused powder coat	
Options		
Smart Module control board (factory-installed)	Dry contact (24VAC - 1A maximum)	
Pre-Charged Refrigerant	R-134a refrigerant, one-shot couplings	
Air Diffusers	Uni-directional or bi-directional	
Agency		
Approvals	CSA 60Hz	CE 50Hz, CSA 50/60Hz

* Refer to **Figure 2** for complete part number.

Table 10 Liebert XDH20 specifications

Models*	XDH20BK XDH20SK (60Hz)	XDH20BS XDH20SS (50/60Hz)
Cooling Capacity	**XDH20**, 60Hz Nominal (98ºF [37°C] EAT): 22kW/6.3 Tons **XDH20**, 60Hz Maximum(105ºF [41°C] EAT): 25.3kW/7.2 Tons **XDH20**, 50Hz Nominal (98ºF [37°C] EAT): 21.6kW / 6.1 Tons **XDH20**, 50Hz Maximum(105ºF [41°C] EAT): 25.3kW/7.2 Tons	
Conditions	Capacity rating is @ 55ºF (13ºC) Entering Fluid Temperature and 50ºF (10ºC) or lower dew point	
Electrical Requirements		
Input	120V-1ph-60Hz	220-240V-1ph-50Hz, CE / 208-240V-1ph-60Hz, CSA
Input power connections	Two IEC320-C14 power inlets and two IEC power cords with NEMA 5-15P plugs	Two IEC320-C14 power inlets and two IEC power cords with IEC320-C14 plugs
Full Load Amps	5	2.5
Power consumption, nominal, Watts	600	575
Dimensions, inches (mm)		
Height—module only	78 (1981)	
Height—including hard-piped connections	80 (2032)	
Width	12 (305)	
Depth	42 (1067)	
Weight, lb (kg)		
Module only	233 (106)	233 (106)
Shipping weight	317 (144)	317 (144)
Number of Fans	6	
Airflow, Nominal, ft^3/min (m^3/hr)	2500 (4248)	2428 (4125)
Audible Noise, Sound Power	81 dBa	81 dBa
Pipe Connections		
Refrigerant supply	1/2" OD, Cu	
Refrigerant return	7/8" OD, Cu	
Serviceable Parts	Fans and electrical components	
Cabinet Exterior Finish	Black, matte finish, heat-fused powder coat	
Options		
Smart Module control board (factory-installed)	Dry contact (24VAC - 1A maximum)	
Pre-Charged Refrigerant	R-134a refrigerant, one-shot couplings	
Air Diffusers	Uni-directional or bi-directional	
Agency		
Approvals	CSA 60Hz	CE 50Hz, CSA 50/60Hz

* Refer to **Figure 2** for complete part number.

Table 11 Liebert XD Flex Pipe one-shot assemblies, supply and return

Description	Length ft (m)	Liebert P/N Straight Connection Assembly	Liebert P/N 90-Degree Connection Assembly	Minimum Bend Radius in (mm)	
				Supply	Return
Liebert XD Flex Pipe Kit	10 (3.0)	186566G2	186565G2	7 (178)	9 (229)
	8 (2.5)	186566G3	186565G3		
	6 (1.8)	186566G1	186565G1		
	4 (1.2)	186566G4	186565G4		

Table 12 Liebert XD Flex Pipe removable assemblies, supply and return

Description	Length ft (m)	Liebert P/N Straight Connection Assembly	Liebert P/N 90-Degree Connection Assembly	Minimum Bend Radius in (mm)	
				Supply	Return
Liebert XD Flex Pipe Kit	10 (3.0)	187865G2	187864G2	7 (178)	9 (229)
	8 (2.5)	187865G3	187864G3		
	6 (1.8)	187865G1	187864G1		
	4 (1.2)	187865G4	187864G4		

Table 13 CANbus cable lengths and part numbers

Liebert Part #	Dimension A ft. (m)
300157G1	6 (1.8)
300157G2	10 (3)
300157G3	20 (6)
300157G4	30 (9.1)
300157G5	60 (18.3)
300157G6	90 (27.4)
300157G7	120 (36.6)
300157G8	150 (45.7)
300157G9	6.25 (1.9)
300157G10	3 (0.9)
300157G11	15 (4.6)
300157G13	40 (12.2)
300157G14	50 (15.2)
300157G15	70 (21.3)
300157G16	80 (24.4)
300157G17	100 (30.5)
300157G18	110 (33.5)

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- Services
- Surge Protection

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